Railway

# Engineering *and* Maintenance

The great economy of spring washers is especially evident in freight classification yards, where heavy switching locomotives shift and shunt thousands of freights under all weather conditions.

Repeated starting, switching, braking, stopping set up unusual tensions, stresses and wear. Under these conditions the tremendous reserve power and the long life of Improved Hipowers are successfully reducing maintenance costs.



IMPROVED HIPOWERS

**IMPROVE TRACK**

SOUTHERN RAILWAY PHOTO

THE NATIONAL LOCK WASHER COMPANY, NEWARK 5, N. J., U. S. A.

A COMPANY OF HIPOWER RAILWAY SPRING WASHERS

# "Maintenance Men" who are always on the Job

• Reliance Hy-Pressure Hy-Crome Spring Washers on track joint bolts are equal to a 24-hour maintenance service.

• They don't even step aside to let the limited go by. Their powerful coil-spring reactive force over an adequate range keeps the threaded parts under constant tension—in traffic or out—instantly, automatically compensating for developed looseness.

• Less frequent maintenance tightening is necessary and, since tight joints deteriorate slowly, less costly rail-end and joint bar treatment is required, keeping track open for speedy delivery of vital material for our nation's defense.

• Whatever the service conditions, whatever the bolt size, there's a Reliance Hy-Pressure Hy-Crome Spring Washer made specifically for the application—scientifically designed, fabricated from special-analysis cold drawn alloy spring steel and uniformly heat treated to develop maximum non-fatiguing reactive force.

• That's why you can count on lower maintenance costs when you use Reliance Hy-Pressure Hy-Crome Spring Washers.

*The Edgemark Of Quality*

EATON

**RELIANCE HY-PRESSURE HY-CROME SPRING WASHERS**

EATON MANUFACTURING COMPANY

**RELIANCE DIVISION, MASSILLON, OHIO**

*Sales Offices:* New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal

# The Stand that HUGS THE GROUND

If you're looking for a switch stand that fairly hugs the ground, then you have the answer in Bethlehem's 1222.

This is a compact stand that's especially useful in crowded yards or confined locations. When used without a target or lamp, the 1222 rises only about 5 in. above the level of the ties. It can be fitted easily into tight places; lies so close to the ground that it isn't a hazard to overhanging loads.

In spite of its compactness, however, the 1222 is a powerful stand designed for rail above the 60-lb class. Equipped with a sliding block and crank device, it builds up great leverage, yet can be thrown with little effort. An adjustable screw eye, threaded into the crank, makes possible switch throws ranging from 3½ to 6 in.

The 1222 is designed primarily for yard service, but it is also suitable for receiving and departure track. Why not let us give you full details—or better yet, show you some installations?

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

**DO YOU KNOW ALL THESE BETHLEHEM TRACK PRODUCTS?**

Bolts and nuts — Crossings — Frog plates
Frogs — Gage rods — Guard rails
Joint bars — Rail braces — Rails
Spikes — Switches — Switch heaters
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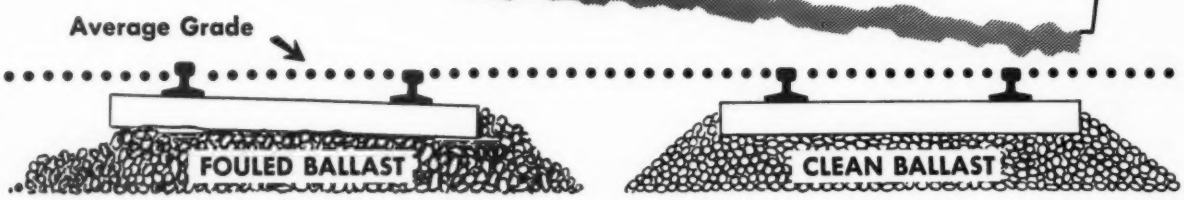
Published monthly by Simmons-Boardman Publishing Corporation, 79 W. Monroe St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Marion, Ind., post office. Address communications to 79 W. Monroe St., Chicago 3, Ill. Volume 47, No. 4.

# Hold Grade Levels

## Yet put up to 18" of CLEAN BALLAST UNDER TIES

Matisa Ballast Cleaner is the ONLY machine capable of thoroughly cleaning ALL BALLAST—beneath ties as well as in cribs. Note that digging teeth pass clear under ties and rails, doing a COMPLETE job.




**BEFORE *Matisa* CLEANING**

**AFTER *Matisa* CLEANING**

Whether to hold grade levels on dirty ballast, or provide a clean ballast cushion with a grade raise has long been a major maintenance of way headache. Now, with the Matisa Ballast Cleaner, you can hold the grade level (or *lower* it), yet put as much as eighteen inches of thoroughly cleaned ballast under ties!

Matisa cleaning—and *only* Matisa—solves the common grade problems at crossings, underpasses and in yards... And used with the Matisa Tamper, produces roadbed that is *better than new-laid track* put down with other ballasting methods.

Matisa Ballast Cleaners are furnished on a supervised rental basis for cleaning 1,000 feet or 1,000 miles of your track . . . rapidly, efficiently and *completely.* Write our M. W. Engineering Department for details on 1951 Cleaner availability.

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***See these tractors perform. They're built for YOUR job!***

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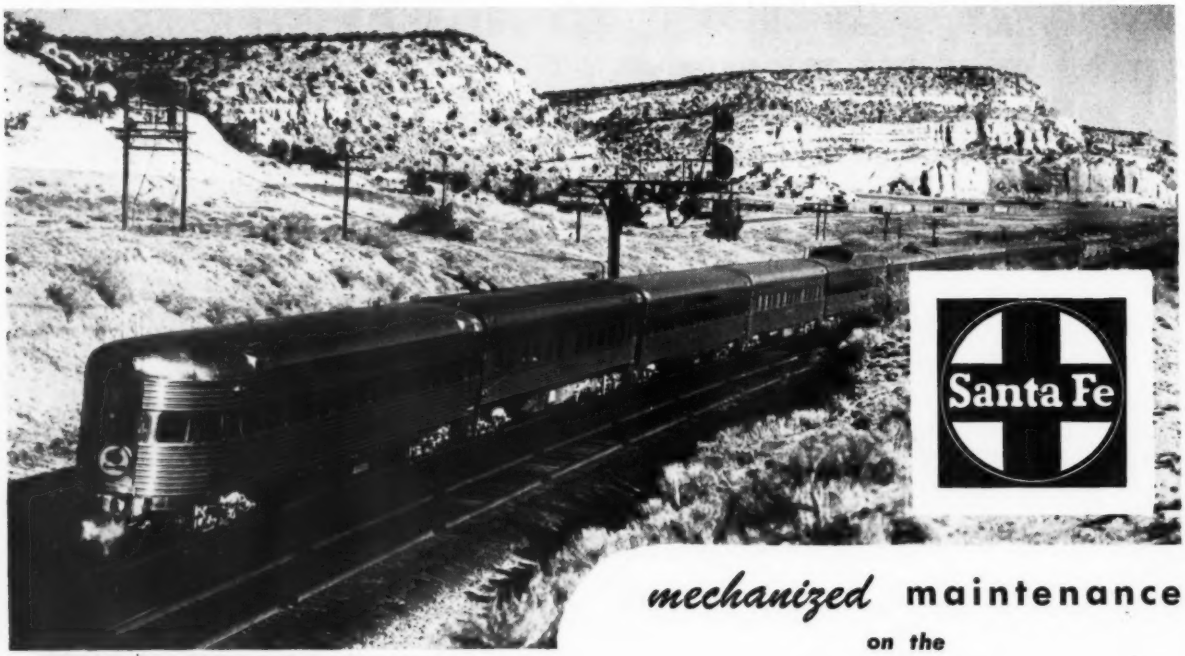
*Originator of the Torque Converter Tractor*




*mechanized* **maintenance**

***on the***

# Santa Fe

**WOOLERY Model PB-B Weed Burner**

An economical and positive means of destroying ALL types of weeds. The Model PB-B Weed burner mounts 3 burners on an underslung steel trailer to be towed by a motor car. All three burners are provided with individual controls, and can be swung in or out, raised or lowered, while machine is in operation. Also all three burners have electric ignition and can be turned on or off instantly. One, two or three burners may be used at one time, as conditions require.

Track maintenance on the Santa Fe is accomplished with the aid of modern maintenance machines, including the WOOLERY Model PB-B Weed Burner.

**PIONEER MANUFACTURERS OF RAILWAY MAINTENANCE EQUIPMENT SINCE 1917**

A 15-ft swath can be fully burned in one trip. A second trip, with burner arms fully extended, will burn a swath 25 feet wide. No vegetation survives the thorough destruction of searing flame applied by the WOOLERY Weed Burner, Model PB-B. Can also be operated as a snow melter in winter.

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*For additional information, use postcard, pages 343-344*

# Best watchman

## ON 100 RAILROADS

From coast to coast, every hour of every day, Western's Model 10 Highway Crossing Signals are protecting lives and property.

- Model 10 eliminates the human element — human errors.
- Model 10 is completely and efficiently automatic—protects against second trains, too.
- Model 10 provides around-the-clock safety—in any kind of weather, under all temperature conditions.
- Model 10 is precision-built for reliability and economy—virtually no maintenance or replacement of parts.
- Model 10 is the result of half a century of specialized engineering in this field.
- Model 10, say traffic experts, is today's best buy in grade crossing protection.

### Proved protection!

Here's just one "case history" from Model 10's unparalleled safety record. In June 1936 two Model 10 crossing signals were installed by the Grand Trunk Western Railroad in Harvey, Illinois. In the preceding 5 years there had been 14 deaths at this crossing. Since Model 10 installation there have been no accidents of any kind.

CERTIFICATE OF MERIT for Safety AWARDED TO WESTERN RAILROAD SUPPLY CO. BY THE NEW YORK WORLD OF SCIENCE AND INDUSTRY

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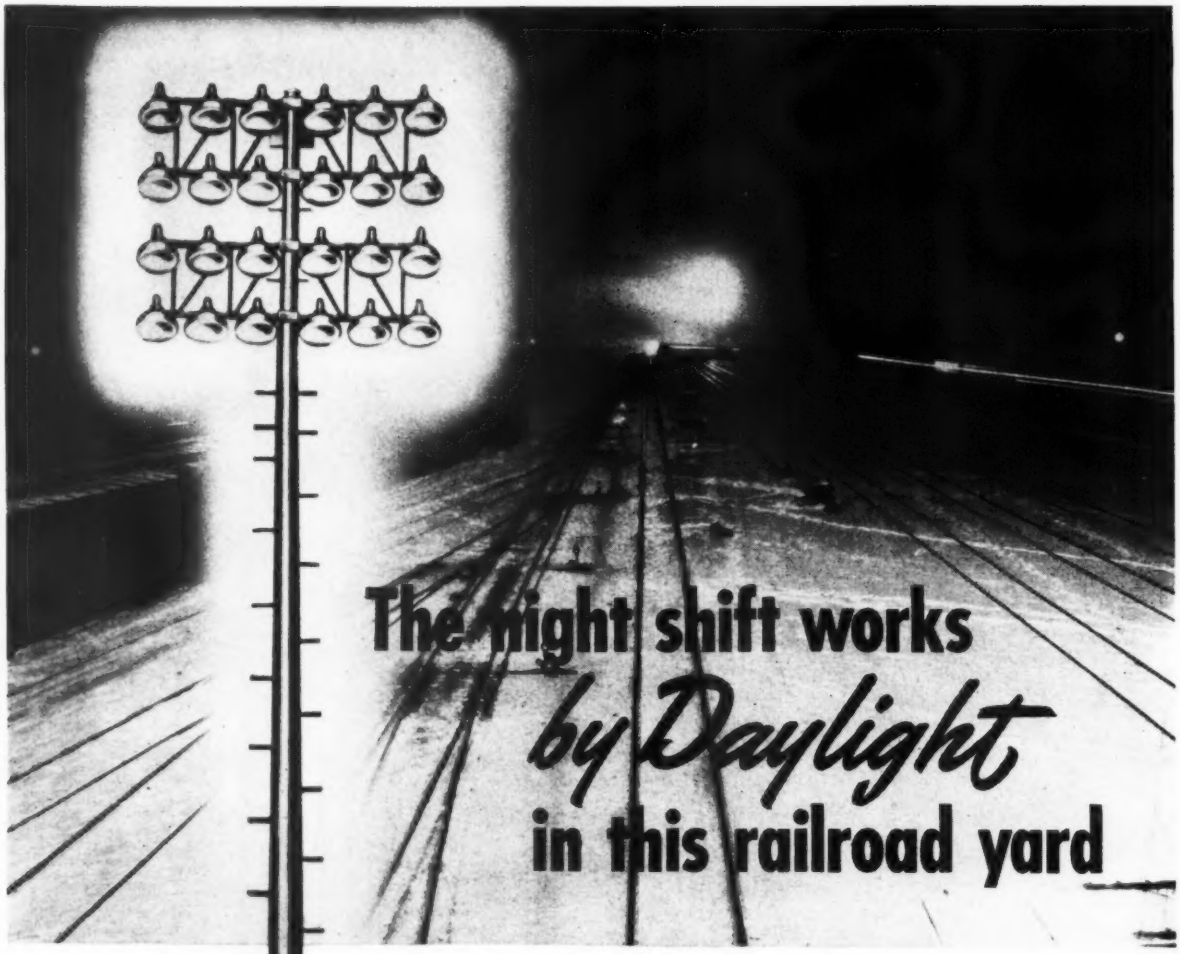

# The night shift works *by Daylight* in this railroad yard

THE intricate networks of rails, switches and feeders in railroad yards are made easily visible at night with light distributed by Union Metal's Steel Floodlighting Poles.

Consider the benefits! Greater safety for workers—insurance against property damage and loss of life—increased efficiency.

Engineered to provide maximum strength and durability, Union Metal's new Floodlighting Poles offer you these:

**FEATURES**

1. Tapered and cold rolled.
2. Complete with combination safety platform and mounting frames.
3. Can be completely wired and lights mounted before erection.
4. No guying necessary.
5. Good appearance, great strength.
6. Standard heights: 40, 60, 80, 100 feet.

For catalog giving engineering details, write to The Union Metal Manufacturing Company, Canton 5, Ohio.

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## UNION METAL

*Monotube Floodlighting Poles*

# How TIMKEN® bearings help keep a right-of-way from going wrong

HERE'S one answer to the never-ending job of keeping right-of-ways in repair—the Fairbanks-Morse No. 53 motor car. Built to take the day-after-day wear and tear of track maintenance work, it's assured of long life and trouble-free performance with Timken® bearings in the wheels. Maintenance time and costs are kept to a minimum.

Timken bearings are precision made and finished to incredible smoothness. Friction and wear are virtually eliminated. Normally, Timken bearings last the life of the car because they're made of Timken fine alloy steel, the best ever developed for tapered roller bearings. Line contact between the rollers and races gives Timken bearings extra load-carrying capacity. And the advanced design of Timken bearings permits the use of tighter closures that keep dirt and moisture out—keep lubricants in.

Due to their tapered construction, Timken bearings take radial and thrust loads in any combination. Wheels are kept in positive alignment and wheel gauge is accurately maintained.

No other bearings give you *all* the advantages you get with Timken tapered roller bearings. Specify them in all the equipment you buy or build. And always look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

*This symbol on a product means its bearings are the best.*

**FAIRBANKS-MORSE** *motor car gives long, trouble-free performance, requires a minimum of maintenance with Timken tapered roller bearings in the wheels.*

**WE MAKE OUR OWN STEEL**

The special grade alloy steel which gives Timken bearings their strength and resistance to wear, is made in our own steel mills.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

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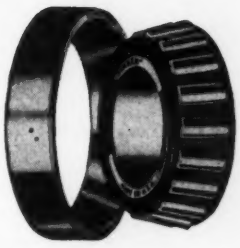
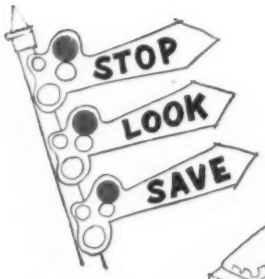
***TAPERED ROLLER BEARINGS***



**NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION →◎←**




# How the Texas & Pacific made station modernization a sound investment

**Sherman, Texas** station was remodeled during the first year of the T & P's now four-year-old modernization program. Here both J-M Asbestos Roofing and J-M Asbestos Siding were used to transform the exterior as shown above.

**Denton, Texas** station of the T & P, shown above, features murals depicting local industries, and city and school life. Note, too, the attractive, modern ceiling obtained through the use of J-M Insulating Board Ceiling Panels.

**Grand Saline, Texas** station has a roof of J-M Asbestos Shingles . . . the same shingles that have survived 40 years service in many installations, and are still going strong. J-M Asbestos Siding Shingles were also used to provide a completely fireproof, maintenance-free exterior.

**Gladewater, Texas** station already had a durable roof of J-M Asbestos Shingles, applied over 10 years ago. J-M Asbestos Siding Shingles were installed to completely make over the exterior.

**Two reasons why** the Texas & Pacific considers its station modernization program a sound investment are the added good will of the public, and the stimulating effect on morale of local employees.

Still another reason is the use of Johns-Manville building products that will stand up for many years to come.

*On station roofs,* for example, the T & P uses J-M Asbestos Shingles. These fireproof and rotproof shingles stand up under constant exposure to sun, wind and rain—require little maintenance. Not one has ever burned or worn out. *On side walls,* J-M Asbestos Siding Shingles provide attractive, maintenance-free exteriors. *On ceilings,* J-M Insulating Board Ceiling Panels give a neat, modern appearance to station interiors. Easy to apply over existing ceilings, these panels have an attractive finish that does not require painting.

Perhaps you are considering a program to modernize *your* older stations. If so—why not make sure that it's a sound investment by using long-lasting, maintenance-free J-M building products. For details write: Johns-Manville, Box 290, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

**Johns-Manville**

**93 YEARS OF SERVICE TO TRANSPORTATION**

# The Most Successful Railroad Contractors use JACKSON MULTIPLE TAMPERS

*A mighty significant fact when you stop to consider that on the Contractor's choice of equipment often depends the difference between making a profit and losing money!*

THESE contractors, operating many of our Multiple Tie Tampers, are thoroughly convinced, as are scores of leading maintenance chiefs, that nothing approaches the Jackson Multiple in its ability to put up track of highest, uniform quality — quickly and at the lowest possible cost per mile.

With a severe labor shortage and unprecedented track requirements in the offing, we honestly believe every maintenance chief, every contractor, should be thoroughly acquainted with the great advantages provided by these machines! Under most conditions they'll more than pay for themselves in a single season. We will gladly arrange to have one of our practical field engineers discuss them with you, send literature or tell you where you can conveniently see them in action.

**ALL MODELS**

**ARE NOW EQUIPPED WITH ADDED TYPES OF BLADES AND TIPS FOR MAXIMUM EFFICIENCY IN ALL MAJOR BALLASTING OPERATIONS — IN ALL TYPES OF BALLAST — AND FOR THOSE SMOOTHING OPERATIONS IN WHICH THERE IS LITTLE OR NO LIFT AND NO NEW BALLAST IS SPREAD.**

**ELECTRIC TAMPER & EQUIPMENT CO.**
LUDINGTON • MICHIGAN

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# ESTERON BRUSH KILLER

Yes, Esteron Brush Killer packs a wallop! This hard-hitting Dow formulation (4 pounds acid equivalent per gallon) now contains the more powerful low-volatility esters of 2,4-D and 2,4,5-T—effective on a wider variety of brush and weeds. Easy and economical to use as a foliage spray, Esteron Brush Killer gives good control of alder, ash, birch, brambles, cherry, elm, hickory, maple, oaks, osage orange, poison ivy, sumac, willow and other hard-to-kill species. It is effective also in controlling resprouting of stumps when it is applied in oil immediately after cutting.

A wealth of information on clearance and maintenance of right-of-ways with chemicals is yours on request. Dow sales and technical men are available for consultation and assistance on *your* vegetation control problems—from grass and weeds in the ballast to heavy brush on the right-of-ways. Write for folder IN-168.

**Also recommended for woody plant control is Esteron 245 (containing new low-volatility esters of 2,4,5-T). For controlling grasses such as Johnson, quack and Bermuda—use Dow Sodium TCA 90%. No fire hazard—and treated foliage presents no poison hazard to grazing cattle.**

*Agricultural Chemical Division*

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

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INDISPENSABLE TO INDUSTRY AND AGRICULTURE

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*For additional information, use postcard, pages 343-344*

# TIME-SAVERS *For* TIME-TABLES

**MOTO-CRANES . . .** roll on rubber at speeds up to 30 m.p.h. —on the highway or cross country.

**MOTO-CRANES . . .** can save time at the yards—or speed to distant jobs along the right-of-way.

**MOTO-CRANES . . .** are propelled by a separate carrier engine, with a second engine for all turntable operations.

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**MOTO-CRANES . . .** can be equipped with 5 interchangeable front ends—to dig, lift, load—handle any material.

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**IN THE YARD . . .**
**ON THE RIGHT-OF-WAY!**

A large, midwestern road is the owner of this Lorain Moto-Crane. Here, it is at work at the roundhouse—equipped with a clamshell bucket—excavating for oil tank facilities and loading into trucks. When that job is done, the Moto-Crane will be off on another—and then another assignment as shovel, dragline, clamshell or crane. And that is the secret of Lorain Motor-Crane popularity. *They get more jobs done!* Mobility is unrestricted. They have the speed, power, mobility and work capacity to go anywhere on a moments call—to lift, or dig, or load—to handle the bulkiest materials from sand to steel. Modern railroading can find a hundred-and-one jobs for a Moto-Crane . . . and save time and money on every job. Ask your Thew-Lorain Distributor for full facts about these "time-savers" that will make your time-tables click!

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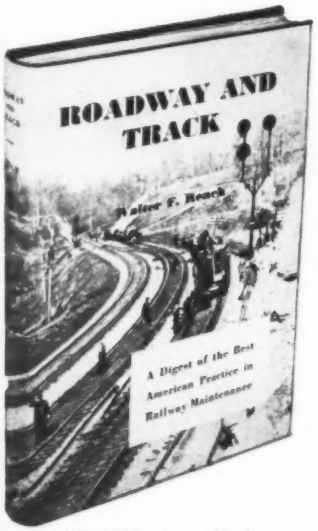
**ON CRAWLERS OR RUBBER TIRES**

A Handbook of
Modern Track Work

# ROADWAY AND TRACK

**By Walter F. Rench**
Formerly Supervisor on the Pennsylvania Railroad;
Author of Simplified Curve and Switch Work




Third Ed. 350 pages, 101 photographs 19 line drawings, 12 tables, index, 6 x 9, cloth, $5.00.

The third edition features the use of the latest mechanical equipment in connection with roadway and track maintenance. Older methods employed where full mechanical equipment is not available are also explained. While most of the methods described are those which are standard on the **Pennsylvania,** A.R.E.A. recommended practices and those in use on other well maintained roads have also been included.

Outstanding types of mechanical equipment used in track work are described and illustrated with action photographs. Engineering drawings show working details. The economies resulting from the adoption of modern methods are clearly outlined. Useful tables have been added to make the book suitable for reference use, as well as a practical handbook on modern methods.

## CONTENTS

Part I—ROADWAY: Essential Elements in Roadway Maintenance—The Right of Way—Drainage of Roadbed and Track—Vegetation for Banks—Economics of Roadway Machines—Labor Saving Methods and Devices in Roadway Work—Small Tools and Their Uses.

Part II—TRACK: Essential Elements in Maintenance of Track—Program for Maintenance of Way and Structures Work—The Track Obstruction—Power Machines and Equipment—Labor Saving Methods in Track Work—Track Materials and Their Uses—Practice in Rail Renewals—Practice in Rail Repair and Inspection—Maintenance of Main Tracks—Maintenance of Yards and Terminals.

Part III—SPECIAL PROBLEMS AND DUTIES: Maintenance Problems and Methods Used—Economics of Track Labor—Special Duties in the Maintenance of Way Department.

SUPPLEMENT: A 10-page Supplement describing new A.R.E.A. recommendations and changes up to July 1, 1948, can be cut for insertion in proper place.

### Send For Your Copy Today

Send for a copy today and see how it will help you improve your knowledge of your work.

### TRACK SUPERVISORS

**While written primarily to serve the needs of track supervisors and other maintenance officers, it contains material of considerable interest to transportation and mechanical officers who require a working knowledge of the fundamentals of maintenance of way practice. Section and extra-gang foremen, who wish to acquire a broader knowledge of their work will find it particularly helpful.**

*— - Ten Days Free Examination Coupon - -*

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We were expecting this call. In a sense it is the people of America on the other end of the telephone. For some time they have been calling upon our government to take whatever steps are necessary to equip our fighting men for any job they may have to do.

Korea has proved the fallacy of limited preparedness. You know now that the nation is girding for survival. The people of America have said—and rightly—that private industry should provide the Armed Forces with whatever is necessary.

Machines are being mobilized. "Caterpillar" products are wearing olive drab once more. Because of large military demands your present machines may have to work longer than you had anticipated.

You can get many extra hours of machine service life if you:

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3. **Secure the assistance of your "Caterpillar" dealer who now, more than ever before, is your working partner for the grim job that may lie ahead.**

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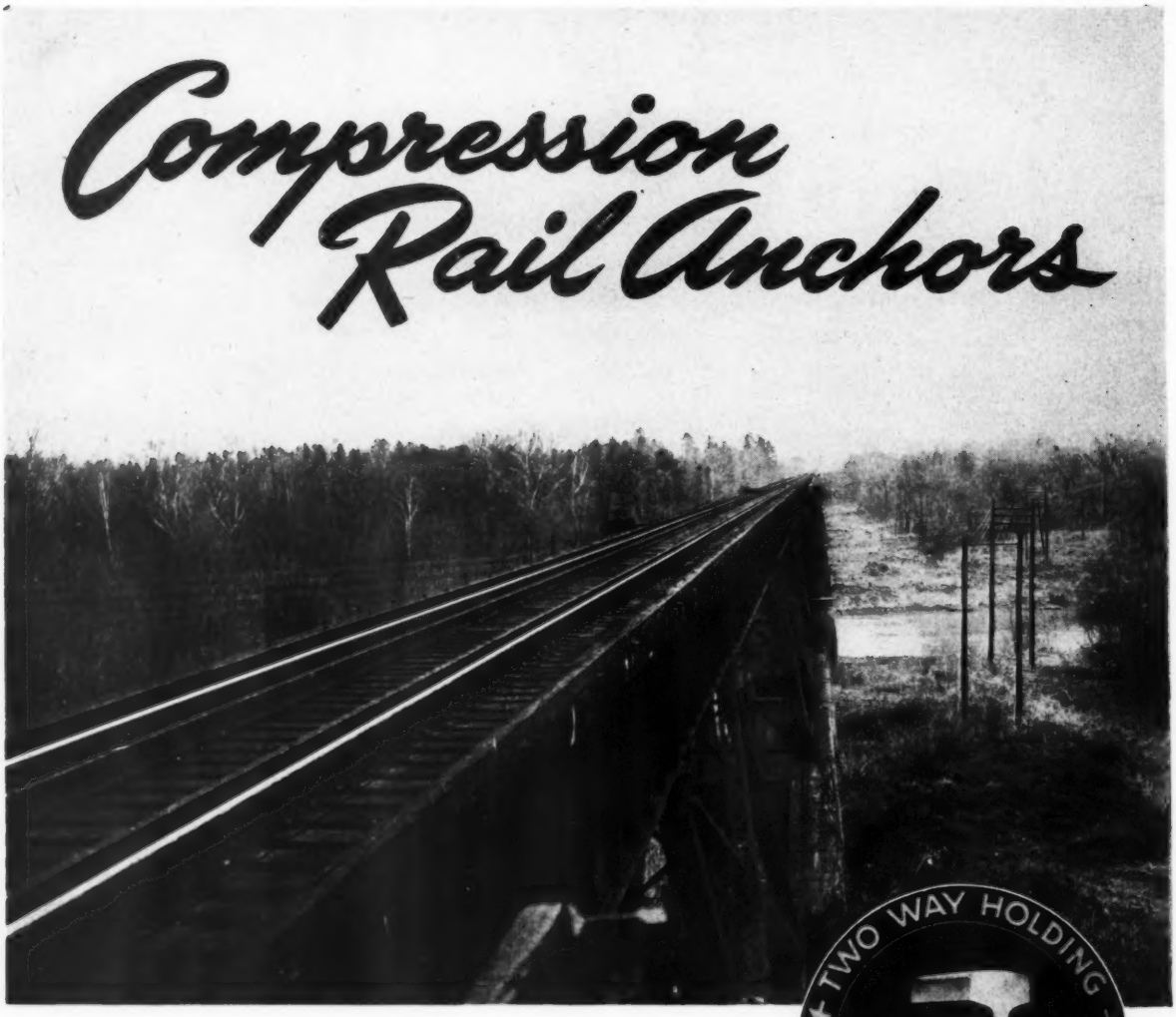
# Compression Rail Anchors




The efficient, economical protection against running rail through the use of Compression Rail Anchors has won significant recognition among bridge engineers. Compression two-way holding is an important feature on a wide variety of bridge and viaduct jobs throughout the country.

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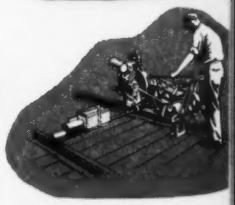
# *right down the line...*

*Modern Mechanization* is the answer to costly, time-consuming maintenance operations . . . *right down the line.* Starting with the removal of old spikes—right on through final stages of rail laying and ballast reconditioning —every Nordberg Maintenance Machine is designed to handle its job with utmost speed and accuracy.

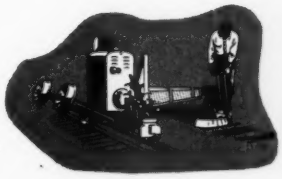
Nordberg Machines have been amply proved in service for over a quarter century in scores of operations formerly done by hand . . . doing them better, faster, at less cost.

Get the facts on Nordberg track maintenance machinery today . . . write for literature describing any or all of the units shown here.

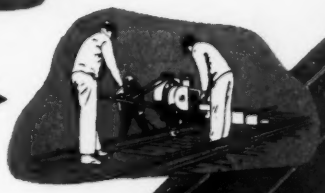
SPIKE PULLER . . . By getting spikes out faster this machine speeds up relaying and reduces the cost of the entire operation. ▶



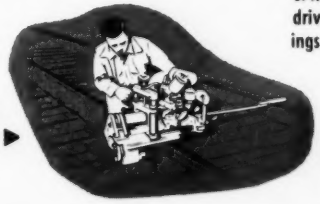
TRACK WRENCH . . . Provides uniformly controlled tightening on track bolts to prolong rail life and make better riding track. ▶



◀ ADZING MACHINE . . . Provides tie sea in keeping with today's track maint nance standards. All level and in san plane.

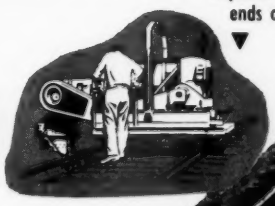


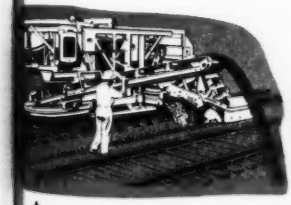
SPIKE HAMMER . . . All spikes driven straight and at big savings in time and money. ▶



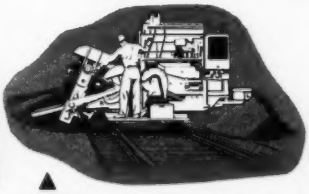
RAIL DRILL . . . A compact, lightweight, low-cost, easily set drill ▶ that proves a money saver.

CRIBEX . . . Removes material contained in the cribs and deposits it beyond the ends of the ties. ▼



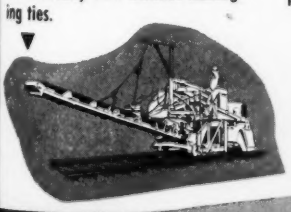


▲ SCREENEX . . . Takes excavated fouled ballast fed by BALLASTEX, screens it, and returns clean ballast to track, intertrack, or shoulder.



▲ BALLASTEX . . . Excavates the ballast in area between tracks or in shoulder. Disposes of it by wasting or by feeding to SCREENEX for cleaning.

DSL YARD CLEANER . . . Cleans more track faster, better, more economically . . . without damaging ties. ▼



POWER JACK . . . Maintains alignment while speeding up ballasting and general surfacing operations. ▼

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. . . for continually improved TRACK MAINTENANCE MACHINERY to do a Better, Faster Maintenance Job at Lower Cost

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# FABCO Self Sealing TIE PADS

## RESILIENT LONG LIVED ECONOMICAL

### They Seal Out Moisture and Dirt and Prevent Mechanical Wear of Ties

**OVER THE YEARS** Fabco Tie Pads of resilient rubber and cotton fibre have demonstrated their ability to prevent mechanical wear of ties through elimination of plate cutting and to give long service as well.

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Sealing agent only on side next to tie permits limited tie plate movement without disturbance to the bond of the tie.

Sealing agent positively adhered to pad without altering structure or characteristics of the pad.

Sealing agent compounded to withstand extremes of weather.

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***For* Maximum Protection Against Mechanical Wear**

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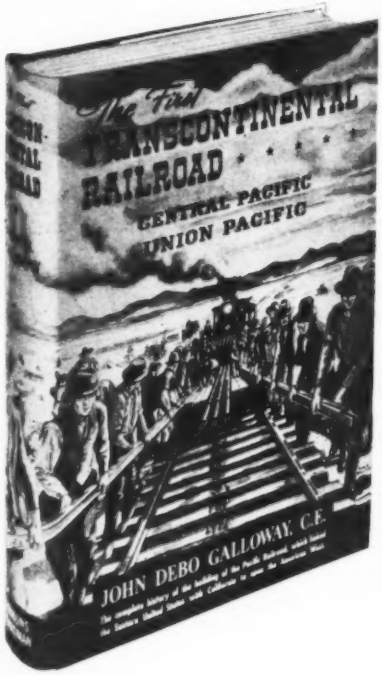


By JOHN D. GALLOWAY, C.E.

The construction of the Union Pacific and Central Pacific railroads linking Omaha with Sacramento was the crowning achievement of the railroad era. It was considered by the author the greatest engineering project of the Nineteenth Century.

The author for more than forty years was a leading consulting engineer of San Francisco. He was thoroughly familiar with the original routes of both railroads. While gathering manuscript material he carried on an extensive correspondence with relatives of the builders. Many of the authentic photographs showing construction methods were from his private collection.

The individual contributions of railroad engineers, construction company heads and railroad officials who had a part in this great project are objectively appraised. Biographical sketches of the more prominent engineers and railroad builders of the era are included.

## Contents

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R. E. & M. 4-51

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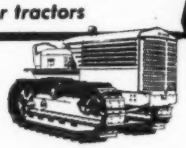
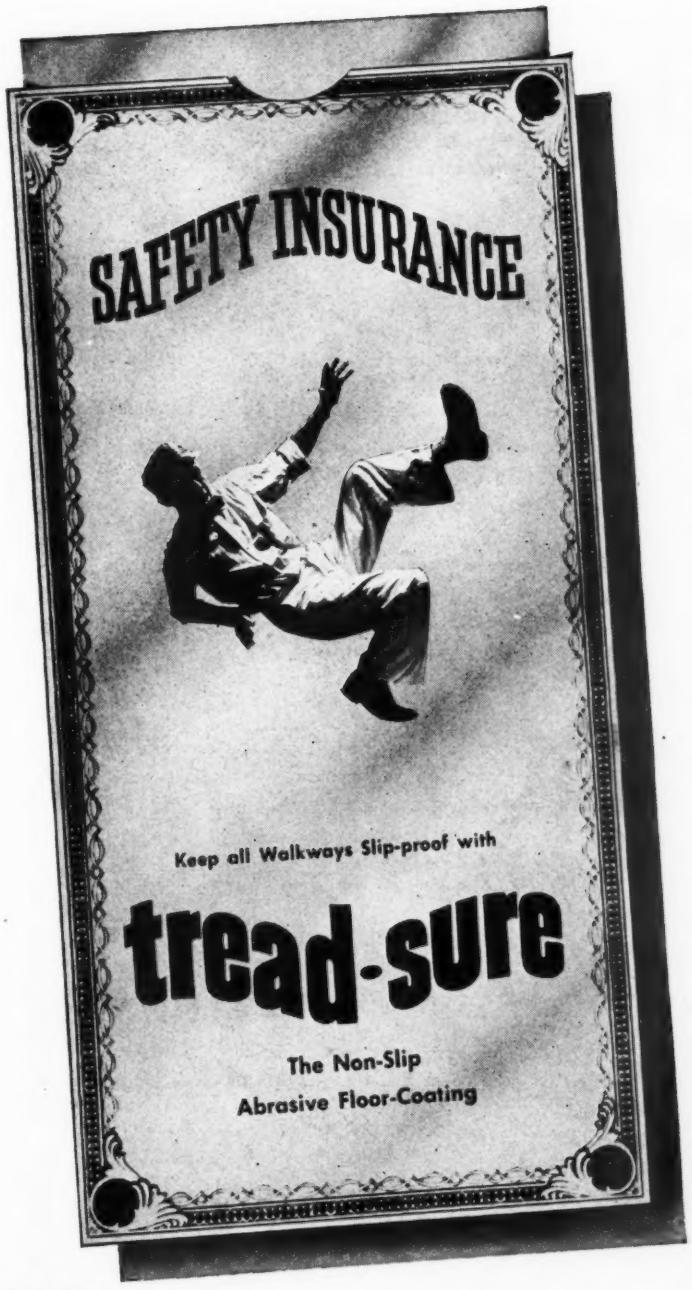




*For additional information, use postcard, pages 343-344*

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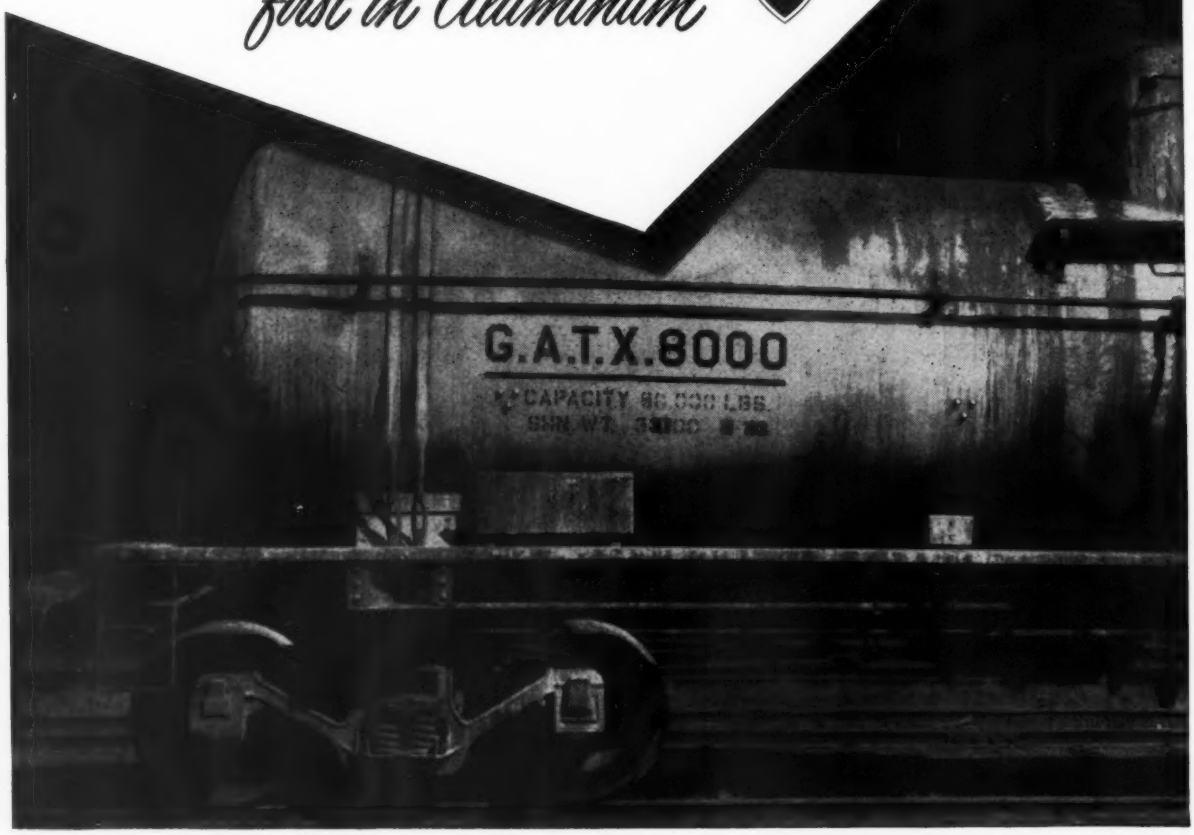

YOUR **EXTRA EMPLOYEE** THAT WORKS WITHOUT PAY

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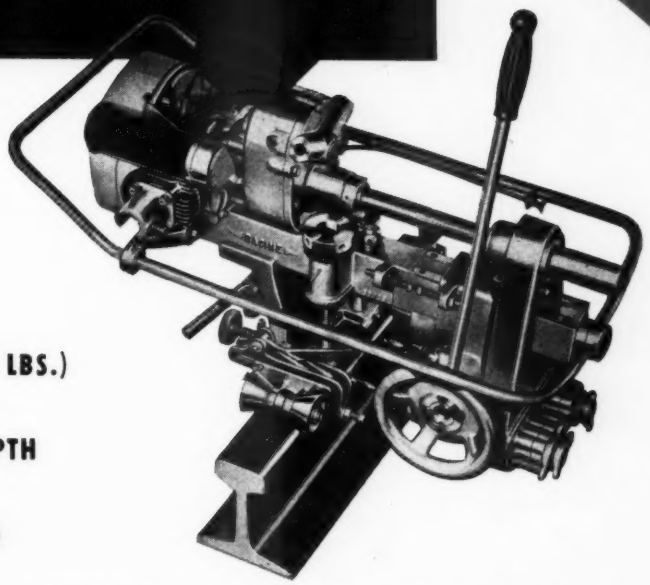
## *Portable*
## BOND DRILL



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A RACINE gas engine powered Portable Bond Drill does the work of several men. It frees man power for other jobs. An "extra employee" in every way but pay.

The RACINE Bond Drill is actually a rugged, accurate drill press built on horizontal lines. Readily rolled along or lifted by one man. Quickly clamped in position for drilling straight round holes. Easily removed to clear the track for traffic.

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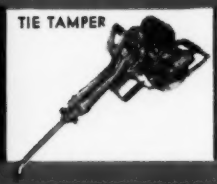

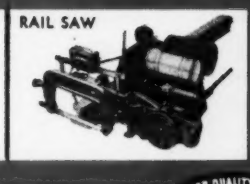


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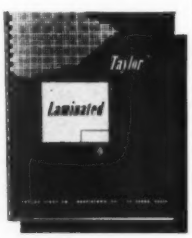


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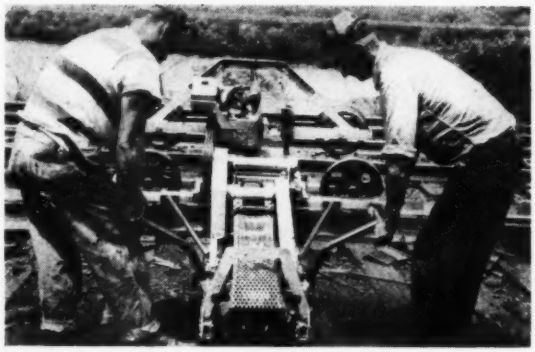

# *NEW* RTW P-46 BALLAST EXTRUDER

For lowering ballast in cribs before adzing ties, this new RTW machine embodies design and operating features that help speed rail replacement jobs and keep down costs. Rugged teeth mounted on an engine-driven endless chain speedily remove ballast to intertrack spaces or to shoulders without damaging ties. Cribs are cleaned to a uniform level, thus avoiding formation of water pockets.

Simple, compact design makes the RTW P-46 Extruder easy to move along track to and from location. A counterbalancing feature minimizes effort required by operator to raise and lower operating head while machine is in use.

Be sure to call or write immediately for full description and prices on this time- and cost-saving unit.

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# Bridge Braces "SHRINK" fitted

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**. . . WITHOUT LOSS OF TRAFFIC TIME**

Today, many railroads have turned the old process of "flame shortening" into a new time-saving and cost-saving technique for reducing the slack in bridge eye-bar tension members.

Using standard Airco oxyacetylene flame heating equipment, "flame shortening" consists of locally heating the bridge member to be shortened, while applying axial, upsetting pressure to the member by means of a yoke. The yoke is clamped to the member on each side of the spot being heated.

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For further information about this unique process, write your nearby Airco office.

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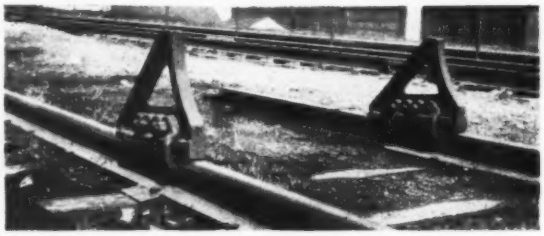
***Costs come down under the Airco plan***

## "HOLD EVERYTHING" AT STUB ENDS OF TRACKS WITH Q AND C CAR STOPS



Q and C Car Stops are suitable for all sections of rail used in side tracks. Their use results in real economy because they are applied with a minimum of labor and require very little track space. They wedge firmly to the rails. No drilling is necessary.

Order now for early delivery.

Other Q & C Products: Compromise Joints, Guard Rail Clamps, Derails, One-Piece Manganese Guard Rails, Switch Point Guards, Anti-Slip Rail Tongs, Electric Snow Melters, Snow Flangers and Plows, Gauge Rods, Flangeway Brackets, Car Replacers, Rail Benders, Track Skates, Foot and Heel Guards, Gauging Tools.

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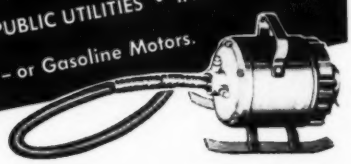

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is important news
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with "
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installed at the be
work. The 39-ft. Ra
Welded Rail Economy Weighed by Carriers
By Edward Kandlik
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a possible source of major future economies in track
tenance.
About 100 executives attending
the American Railway En
Assn. convention in
last week journeyed to
City, Ind., to study an
of continuous rail being
by the Chicago Sout
South Bend Railroad.
The South Shore
made two installatio
The South Shore plan is
about 36 standard rails int
foot sections. Laying such
a trick. A 1,400 foot
st be lined up
the flat
Officials View South Shore's Rail Weld Job
than 100 railway officials
ay watched a Chicago,
hore, and South Bend rail-
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lding project which will
eliminate the "clickety
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of Michigan City.
ore officials explained
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pleted. In 1938 and
s were installed in
of East Chicago's
In 1944 and 1945
mile section was
igan City pave-
RF&P Ending Click-Clack Song of Rails
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needn't listen for the traditional
clickety-clack of the wheels on the
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Evidence Grows That Welded Rails Will Prove Big Saving
By NANCY FORD
Will extended use of welded, or continuous, rail give the railroad in-
r its next big cut in operating costs.
here is growing evidence it may, although it will be several years
operating accounts reflect the benefits.
h if operating men were tomorrow to embrace this idea enthus-
y, it obviously would be some ing conventional, 39-foot
efore maintenance savings
for welded rail could greatly weight into "st
e its use in rail-relaying so me
placements
• • • Welded Savings. With such technical obstacles overridden, weld enthusiasts emphasize the economies. With 39-foot rails the carriers must spend $10 a mile for every

**First:** RIBBONRAIL means low maintenance costs. Joint bars and bolts—the starting points of costly wear and corrosion—are eliminated. Instead, long lengths of rail—that provide smooth riding—require little, if any maintenance. Like diesels, CTC, and air-conditioning, RIBBONRAIL stands for Progressive Railroading.

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Use RIBBONRAIL in your track program. Write for booklet, "Progress in Rail Pressure Welding."



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**A Division of Union Carbide and Carbon Corporation**
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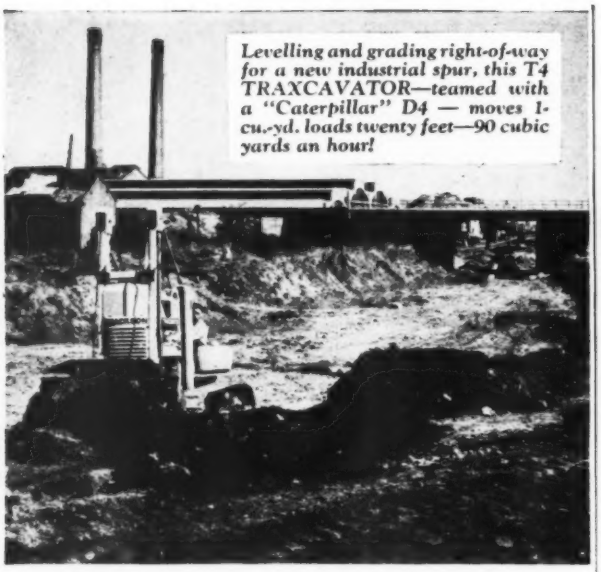

*Levelling and grading right-of-way for a new industrial spur, this T4 TRAXCAVATOR—teamed with a "Caterpillar" D4 — moves 1-cu.-yd. loads twenty feet—90 cubic yards an hour!*

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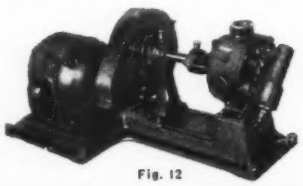

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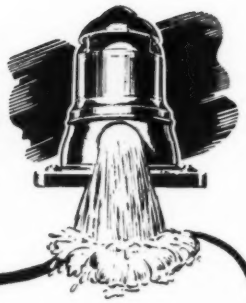

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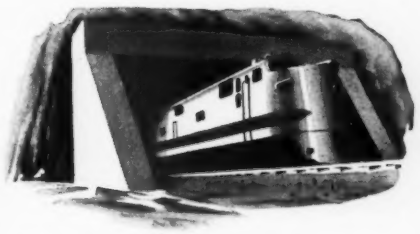

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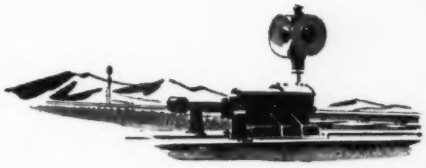

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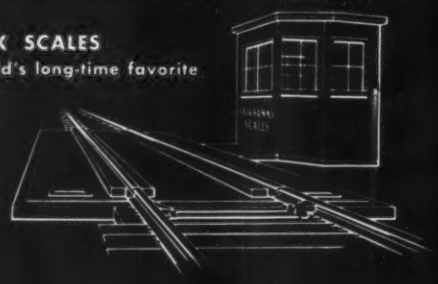

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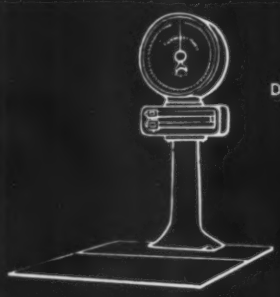

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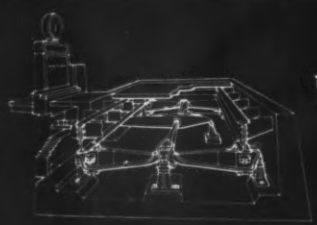

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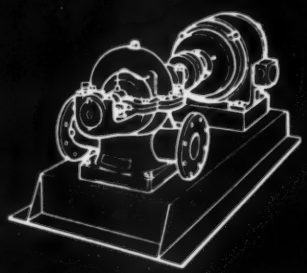

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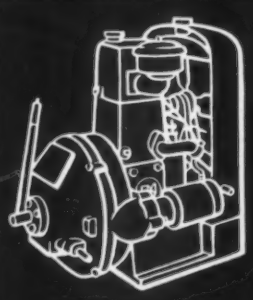

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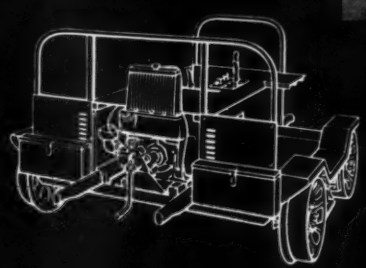

# ADDITIONAL INFORMATION

*On Any of the Products Mentioned in This Issue*

**Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.**

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Spray train operating in southwest territory. General Chemical's Weed Control Service provides modern spray trains and highly trained technicians.

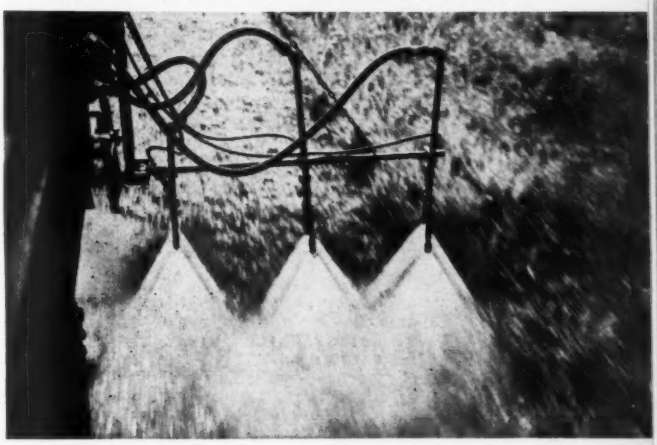
Out of its extensive background in handling individual railroad weed problems, General Chemical has developed a modern method of control which now enables a road to achieve clean track immediately . . . with a continuous reduction in root growth, coupled with diminishing costs.

Such results are obtained by a two- or three-year program following an application schedule *especially tailored to overcome each road's particular weed problems.*

Aimed at control of perennial root systems, General's scientific method assures killing off of long established perennials; continually reducing amount of regrowth year after year; eliminating heavy seed germination; and preventing outside encroachment in subgrade. With this thorough method, track can be maintained in a relatively weed-free condition with minimum dosages!

While initial costs may be somewhat greater than for temporary annual relief, such a high level of continuing control is achieved that the over-all long-range costs are far less and lead to increased savings. The end result is track which can be kept weed-free year after year with the smallest possible budget.

Duplex spray system gives complete control for all conditions. Two sets of remote-controlled spray heads permit instant application of correct dosages for any type of weed growth and track conditions encountered.



Main line track in central Illinois shows typical results. Sub-grade and berm received a single treatment for two successive years. Now cleared of root systems of Goldenrod, Perennial Sunflower, Bracken, Dogbane, other weeds.

### Important Information Available—

To help railroad managements in planning their weed control programs, General Chemical has just published a descriptive portfolio "A Policy Decision in Railroad Weed Control". Outlining General's method of treatment, it contains full color illustrations of results achieved in northern and southern areas. Copies may be obtained by writing on business letterhead to Weed Killer Department, General Chemical Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y.

No. 268 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

79 W. MONROE STREET
CHICAGO 3, ILL.

**Subject:** Our High Standing

April 1, 1951

Dear Readers:

I am sure you will be interested in the results of a recent survey made to determine which publications are most widely read and highly valued by railway engineering and maintenance officers. In making this survey a questionnaire was sent to 3479 railway men having administrative and supervisory duties with reference to the construction and maintenance of tracks, bridges, buildings and water-service facilities. The survey was made and the results tabulated by the Recording & Statistical Corporation, New York.

The recipients of the questionnaire were first requested to indicate the relative value to them of five publications, rating them by numbers 1,2,3,etc. The publications listed were Construction Methods and Equipment, Engineering News-Record, Modern Railroads, Railway Age and Railway Engineering and Maintenance, in the order given. The 1281 answers to this question gave Maintenance more first votes, 774, than all the other publications combined. The magazine making the next best showing (Railway Age) received 170 first votes, the third, 62, the fourth, 51, and the fifth, 24.

Two questions were then asked. Question No. 1 was: "If you had your choice of ONE publication, which one would you pick?" Of the 1182 responses to this question, 856, or 72.4 per cent, voted for Maintenance. The publication ranking second (Railway Age) received 194 votes, the third, 58, the fourth, 54, and the fifth, 18.

Question No. 2 was: "Which one (of the five publications listed) in your opinion contributes most to the railways' engineering and maintenance department?" Of the 1049 respondents answering this question 945, or 90.1 per cent, voted for Maintenance. The second publication (Railway Age) received 77 votes, the next two, 16 each, and the fifth, 11.

Needless to say the excellent showing made by Maintenance in this survey is highly gratifying to the editorial staff. The knowledge that the work we are doing is proving of such value to our readers is a source of great personal satisfaction to all of us. At the same time we are deeply conscious of the fact that this "vote of confidence" was possible only because of the hard work and careful planning that have gone into the preparation of the monthly issues of this magazine over a period of many years. We know that, to merit the same high degree of confidence on the part of our readers in the future, we must do at least as well as we have in the past. The only way of being certain of accomplishing this objective is to raise our sights and try to do even better.

I wish also to call your attention to the fact that, on all three counts, the Railway Age received the next highest number of votes. What this means is that Railway Age showed by far the highest rating among the broad-coverage publications. Another tribute to a Simmons-Boardman publication of which we on the staff of Maintenance are justly proud.

Yours sincerely,

Merwin H. Dick

MHD:ag

Editor

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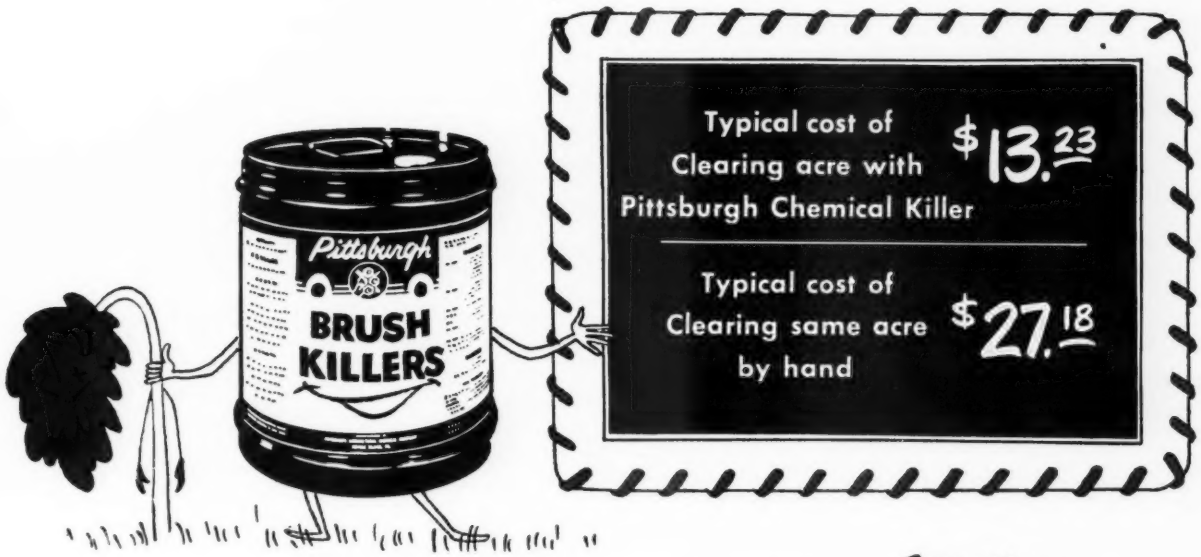


Right *now* is the time to start planning your 1951 brush control program! And the fast, economical, *tested* way to eradicate brush and woody growth is to spray with Pittsburgh liquid chemical Brush Killers. They're safe, easy-to-use, far less costly than hand methods, and there's a formula for every brush eradication job:

### *Power Line Rights of Way*

Pittsburgh Brush Killers clear power line rights-of-way faster and at far lower cost than hand methods. This type of thorough clearance lessens fire danger, encourages sod coverage, thus reducing soil erosion. **Pittsburgh Brush Killer No. 22** recommended.

### *Track Clearance*

**Pittsburgh Brush Killer No. 22** (2,4-D and 2,4-5-T) is ideal for clearing a clean roadway along track beds. A powerful eradicator, it clears far more trackage per day than hand cutting, costs less per mile, and lowers future track maintenance costs.

### *Farmland Clearance*

**Pittsburgh 10-20 Brush Killer** (2,4-D with 2,4,5-T added) gives farmers a fast, sure, low-cost method of clearing pastures, fence rows, ditches, etc. Improves the appearance and value of land. (**Pittsburgh Brush Killer No. 43** (2,4,5-T) recommended for brambles and briars.)

## *Write Today for Bulletins on Pittsburgh Brush Killers*

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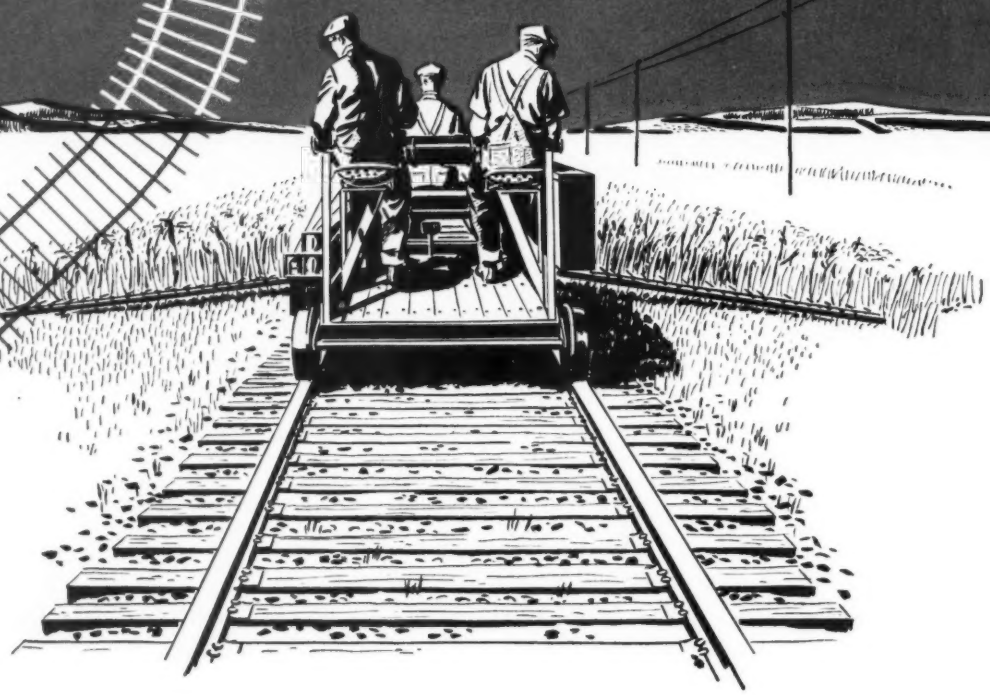

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Published on the first day of each month by the

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79 West Monroe St., Chicago 3

New York 7,
30 Church Street

Washington, D. C., 4
1081 National Press Bldg.

Cleveland 13,
Terminal Tower

Portland 5,
514 Terminal Sales Bldg.

Los Angeles 17,
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Subscription price in the United States and Possessions and Canada, 1 year $2; other countries in Western Hemisphere, 1 year $5, 2 years $8; all other countries, 1 year $7, 2 years 12. Single copies, 50 cents each Address H. E. McCandless, Circulation Manager, 30 Church Street, New York 7, N. Y.

Member of the Associated Business Papers (A.B.P.) and of the Audit Bureau of Circulations (A.B.C.), and is indexed by Engineering Index, Inc.

PRINTED IN U.S.A.

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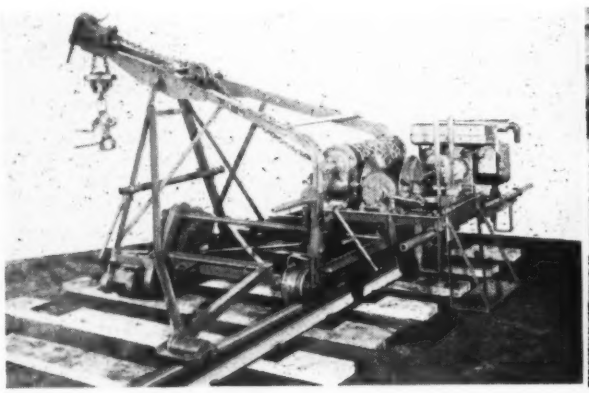

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# Getting Materials —

## Don't Overlook Any Opportunities

One of the current headaches afflicting maintenance-of-way men stems from the difficulties being experienced in obtaining the materials, tools and machines necessary to carry out the rather ambitious maintenance programs that they have planned for the 1951 working season. That there are plenty of difficulties inherent in the situation cannot be denied. The question is whether the railroads as a whole are making the best of the present priorities available to them for getting materials, and are prepared to take advantage of future amendments in regulations governing the allocation of critical materials.

Until recently no DO (direct order) rating was available for use in obtaining materials, tools and equipment required for maintenance purposes. However, on February 27 the National Production Authority issued Regulation 4 and Direction 1 which make available to industry, including the railroads, the use of a DO rating to acquire maintenance, repair and operating supplies. The rating involved is known as DO-97. Although the regulation imposes a number of restrictions on the use of this rating it should be of considerable potential value to the railroads in helping them to obtain earlier deliveries on some of their requirements.

For instance, the rating may be used in ordering tools and machines costing not more than $750. Superficially, this cost limitation may appear to render DO-97 of little value in obtaining maintenance machines, but actually there are a considerable number of units, such as impact wrenches, chain saws, and grinders, that fall under this ceiling. Moreover, the rating may be used in obtaining all manner of spare parts. Another point to remember is that it can be applied to orders for materials or machines that were placed before it went into effect, and when so applied may be effective in obtaining substantially earlier deliveries.

Since important changes in the priorities picture can, and quite likely will, occur overnight, it is important that the railroads be prepared to take advantage of favorable developments. It is expected, for example, that an interpretation of Regulation 4 with reference to its applicability to the transportation industry will soon be issued. It is not unlikely that this interpretation, which may conceivably be in effect before this issue is off the presses, will contain one or more amendments to the original regulation which will enhance its value to railroad maintenance departments.

It is by no means the intention to give the impression here that DO-97 is the answer to all the materials problems besetting maintenance-of-way men. Actually it falls far short of providing the relief required if the needs of the railroad are to be fully satisfied. This larger problem of getting government agencies to give adequate recognition to the railroads' requirements for materials is one that calls for group action on the part of the carriers through established organizations, such as the A. A. R. In the meantime, it is largely the responsibility of individual railroad men to make certain that the most effective use is made of the priority ratings now available to them, or to be made available in the future.

## THE YARD FOREMAN—

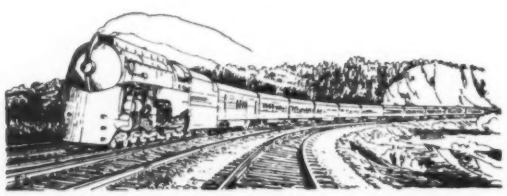
### *There's a New Spring in His Step*

ANYONE who has ever seen a cock pheasant strutting in the vicinity of his flock can never forget the sight. But you "ain't seen nothing yet" until you've seen a yard foreman "glowing" with pride as he surveys the work accomplished by an on-track tamper surfacing his tracks on stone ballast. Strutting back and forth, on such a momentous occasion, the yard foreman may not be as "pretty" as the pheasant, but he feels more important than he has ever felt before. That is a good omen for him and the railroad for which he works. His new-found importance and the changes that have wrought it, presage greater efficiency of his forces and faster movement of cars through his "domain".

Many yard foremen in the past decade or more, have witnessed many significant changes occurring about them. Diesels have all but supplanted steam locomotives; coal docks have given way to fuel-oil stations; ash pits are things of the past; yard offices are now "up in the air"; and loud speakers are everywhere in evidence. All of these changes have affected, to some extent, the work of yard foremen. But, to these men, none of the changes can compare in importance with the higher standard of track maintenance now scheduled for yards and the use of power tamping equipment to obtain and perpetuate that higher maintenance standard.

Most yard foremen have, until now, suffered from a heritage of deprivation. Their best supplies have never been anything but second-hand material "handed-down" from the main-line foremen. Often their work-equipment has consisted of little more than a switch-point grinder and a welding torch. Their ballast has been cinders or car droppings and their tamping tools have frequently consisted of shovels. All too often, their work has been confined to the patching of trouble spots brought to light by derailments of yard engines. For many of them their only contact with high standards of maintenance has been made during those times when they were given the dubious privilege of helping their main-line colleagues smooth up their track for annual or periodic inspections. The brightest spots for most of them have been those pay days when they received their major reward—more overtime pay than their main-line cousins.

Replace these conditions with such innovations as new, heavy rail, even if it is called X-Rayl; new switches and frogs; stone ballast; on-track tampers and other mechanical equipment—and there is little wonder that a yard foreman beams, struts, and begins to feel important. Railways that have instituted such new and improved practices in maintaining their yards expect to benefit from the use of better materials and power tools, but in thereby putting a "new spring in the step" of each yard foreman, they are receiving even greater dividends—proud, attentive, energetic, loyal employees, who know they are not the low men on the maintenance totem pole. The value of such dividends is intangible, but is limited only by the extent of the use made of them.



## SURFACE DITCHES—

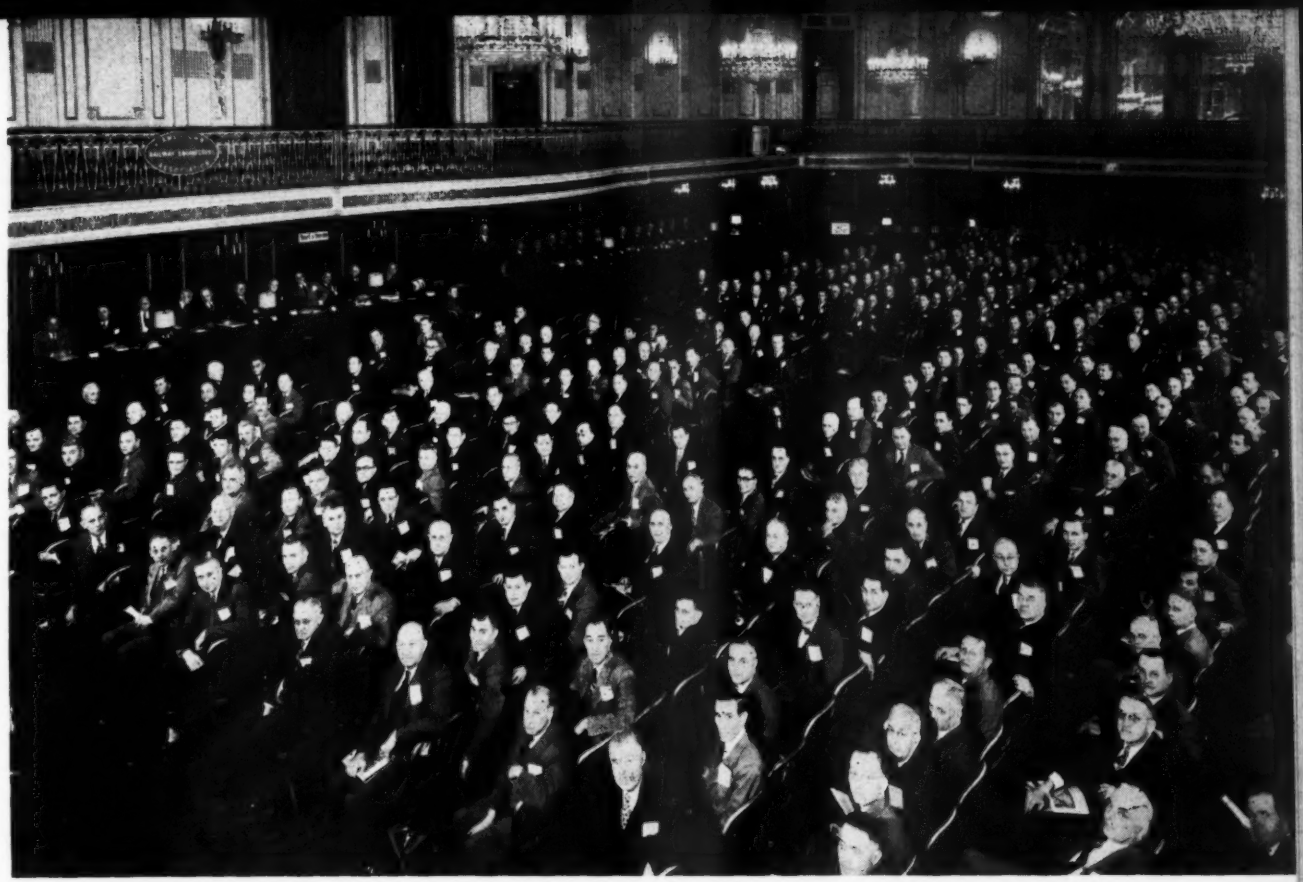
### *Are They Ready for Their Spring Performance?*

THE NEXT two months will bring the usual spring rains plus a few rainfalls of severe intensity and of short duration which will test the adequacy of right-of-way drainage ditches. The test will be decisive because the track will either come through unscathed, permitting normal train operation, or will emerge with mud deposited over it, or with the ballast washed out, or the roadbed gone.

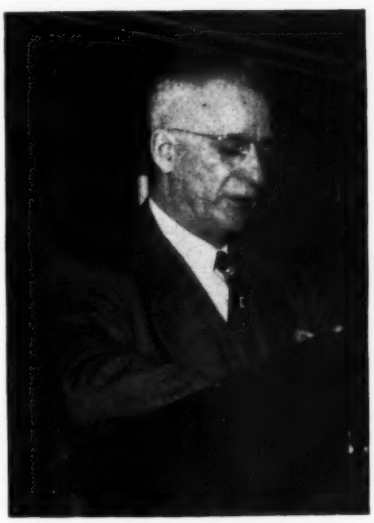
The responsibility for the proper performance of surface ditches is vested in the track supervisor. When side ditches are too small to allow the free passage of water during storms, he will be expected to explain the situation. Also, he will be held responsible if vegetation and brush, permitted to grow within these waterways, cause the flow of water to be impeded.

Now is the time for the supervisor to take stock of the drainage conditions on his territory while remedial measures can still be made effective. Improperly placed surface ditches or those inadequately constructed are frequently the cause of slides. Fences across ditches, or the presence of wind-blown debris, driftwood, temporary "footbridges," and fallen rocks can quickly nullify the purpose of a surface ditch. Ties unloaded within reach of storm waters may also clog a ditch. It will be well also to observe whether ice and snow have caused the diversion of surface waters in such a manner as to produce a scouring action on the roadway. Further, the flow of water in drains leading toward the track should be checked with rocks, cribbing, or dams to prevent the undermining of the roadbed.

One of the first points of attack in assuring proper drainage is the cleaning out of the inlets and outlets of culverts. In this connection care should be taken not to overlook the blocking of culverts under highways at grade crossings by highway patrol equipment When smoothing highway shoulders and slopes, these machines drag earth, mud and sod along until they arrive at the railroad. There, raising their blades, they frequently leave large deposits of material. Unless this material is removed the culvert openings will remain blocked, resulting in a wet roadway and a poor railroad crossing.



In Grand Ballroom of the Palmer House during the opening session on March 13



President Loeffler at opening session

# Large Meeting Held by A.R.E.A. at Chicago

**Engineers gather from all parts of the country to hear program of reports and addresses at the association's annual convention. Attendance was up slightly in comparison with previous year**

• A total of 1707 members and guests of the American Railway Engineering Association congregated at the Palmer House, Chicago, last month to participate in the fiftieth annual convention of this association. Of this total 1024 were members of the association and 683 were guests. The total was slightly above the registration of 1697 members and guests at the 1950 convention, but somewhat below the record registration of 2124 at the Golden Anniversary convention in 1949.

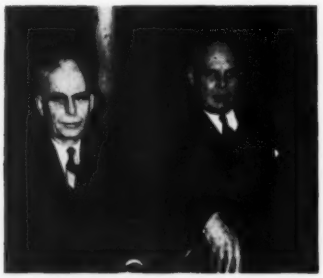
As usual the principal business transacted consisted of the presentation and consideration of reports of the association's technical committees, now consisting of 21 standing committees and the new special committee on Continuous Welded Rail. Many of these reports involved recommendations regarding Manual material. In addition to the usual reports on assigned subjects, a number of the committee presentations were supplemented by one or more addresses.

An unusual number of addresses was presented at the opening session on Tuesday morning, March 13. The speakers at this session included J. H. Aydelott, vice-presi-

### Convention Pictures

**One of the advantages of attendance at the A.R.E.A. convention is the opportunity it affords for renewing old acquaintances, making new ones and "talking shop". The candid pictures shown on the following pages are ample evidence that this opportunity is not neglected.**

H. W. Van Hovenberg, St. L. S. W.; R. C. Bardwell, C. & O.



F. M. Patterson, L. V.; G. A. Phillips, D. L. & W.

T. A. Blair, A. T. & S. F.; W. S. Boyce, Col. Fuel & Iron Corp.; A. R. Wilson, P. R. R. (ret.)

W. P. Eshbaugh, G. & W.; J. G. Gilley, C. & O.; C. I. Hartsell, C. & O.

J. B. Schaub, I. C.; R. L. Fletcher, Timber Engineering Co.; A. G. Dorland, E. J. & E.

J. C. Parsons, C. & O.; A. B. Pierce, Sou.; J. E. Fanning, I. C.

F. H. McGuigan, M. P.; W. H. Giles, M. P.; G. Campbell, Johns-Manville

W. E. Webb, N. Y. C. & St. L.; G. E. Chambers, J. Stang, both N. Y. C.

P. P. Wagner, F. S. Schwinn, both M. P.; R. M. Jenner, E. J. Powell, both Ry. Maint. Corp.

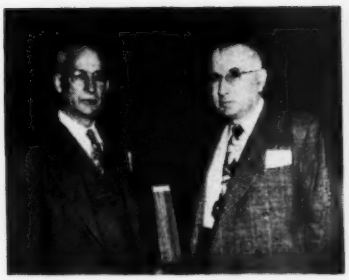
E. L. Anderson, St. L.-S. F.; Quin Baker, Q. A. & P.; L. M. Harsha, St. L.-S. F.

dent, Operations and Maintenance department, Association of American Railroads, who spoke on "A War Economy—Will It Leave the Railroads Unscathed?"; P. T. Trax, assistant supervisor of track, Pennsylvania, whose subject was "The A.R.E.A. from the Viewpoint of a Junior Member"; and G. M. Magee, research engineer, Engineering Division, A.A.R., who spoke on "Highlights in Engineering Research." Also at the opening session H. S. Loeffler, assistant chief engineer, Great Northern, and president of the A.R.E.A., gave an account of his stewardship of the affairs of the association, and Neal D. Howard, secretary, presented his annual report.

Mr. Howard first pointed to the increase in membership that occurred during the past year and then noted that a special development with respect to membership during the year was the increasing number of members entering the military service of the country. "In view of this development," he said, "the Board of Direction reactivated its World War II rules with respect to members in military service, under which such members are relieved of all dues payments for the period of their service, while at the same time they are assured of receiving all of the publications of the association.

In a discussion of the work com-

P. T. Trax, C. G. Grove, both P. R. R.



H. S. Loeffler, G. N.; G. M. O'Rourke, I. C.

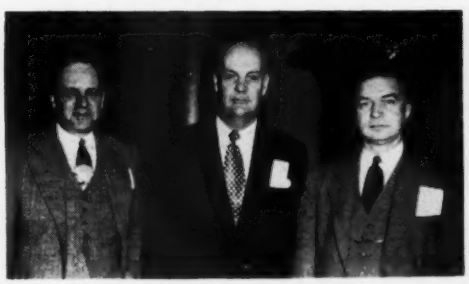
L. E. Flinn, Dearborn Chemical; I. C. Brewer, W. B. Lakoski, both C. M. St. P. & P.

P. C. Parlett, I. C.; H. E. Jones, L. & N. E.; R. H. Mansfield, American Creosoting Co.

C. B. Martin, N. Y. C.; M. Friedman, N. Y. C.; T. J. Engle, C. R. I. & P.

J. A. Curtis, Pullman-Standard; H. J. Weccheider, Erie

B. E. Daniels, C. M. St. P. & P.; H. Austill, T. R. R. A. of St. L.



F. A. Douglas, C. K. Luyster, both Woodings-Verona; H. W. Kellogg, C. & O.

A. R. Harris, C. & N. W.; E. A. Johnson, I. C.; W. E. Robey, A. T. & S. F.; C. H. Sandberg, A. T. & S. F.

S. M. Dahl, F. M. Jones, H. C. Minteer, R. W. Kjosness, all C. M. St. P. & P.

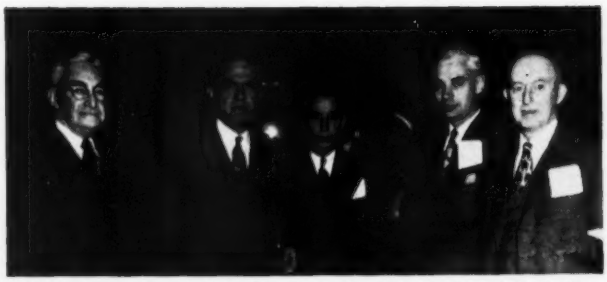
mittees, Mr. Howard noted that five emergency committees had been appointed "to review the emergency provisions and specifications adopted by the association during World War II, in the light of the new mobilization effort of the country," and that the "labor and materials conservation" assignment which the standing committees had carried during the last war had been reassigned to them.

Still another feature of the opening session was the presentation of an honorary membership in the A.R.E.A. to John E. Armstrong, chief engineer of the Canadian Pacific, and a past-president of the association. As part of this presentation Mr. Armstrong's career and accomplishments were reviewed by H. R. Clarke, chief engineer of the Burlington Lines. In the absence of Mr. Armstrong the honorary membership certificate was accepted by his son, John E. Armstrong Jr., assistant district engineer of the C.P.R.

One of the outstanding events of the meeting was the annual luncheon held Wednesday noon, March 14, at which the principal speaker was John M. Budd, vice-president, operations, Great Northern.

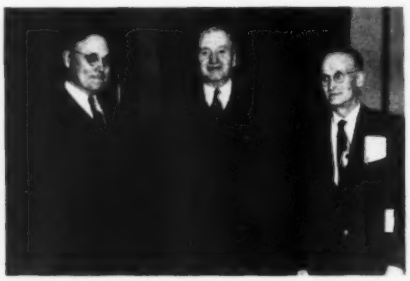
All sessions of the convention were presided over by President Loeffler, assisted by Secretary Howard and Vice-President T. A.

R. E. Dove, R. E. & M.; C. E. Bryant, Johns-Manville; A. G. Reese, C. B. & Q.

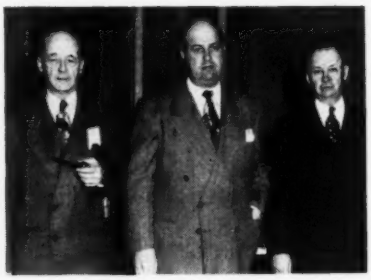


W. T. Jones, Barco Mfg. Co.; S. R. Hursh, P. R. R.; H. S. Ashley, B. & M.; W. H. Ripken, Fairmont Ry. Motors, H. C. Archibald, B. & M.

J. L. Rippey, N. Y. N. H. & H.; O. W. Stephens, D. & H.; N. D. Howard, A. R. E. A.



R. J. Gammie, T. & P.; J. C. Forbes, O. F. Jordan Co.; J. R. Rushmer, A. T. & S. F.



L. W. DesLauriers, C. P. R.; M. R. Brooks, C. B. & Q.; J. R. Kanan, C. & S.

A. B. Fowler, C. A. Roberts, B. J. Shadrake, all Erie; J. C. Simmons, Rust-Oleum Corp.

F. J. Bishop, A. C. & Y.; F. W. Blitz, Reading; A. C. Clarke, B. & O.; E. H. Barnhart, B. & O.

Rockwell Smith, A. A. R.; C. D. Turley, J. C. Jacobs, both I. C.

L. W. Wood, U. S. Forest Products; O. E. Mace, C. & O.; B. Chappell, C. N. R.

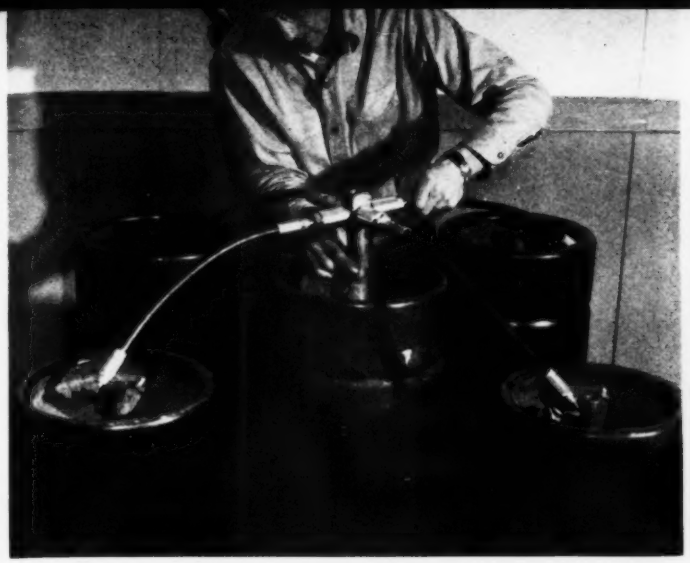
W. A. Krauska, M. P.; F. R. Naylor, A. H. Meyers, both T. & P.

Blair, chief engineer system, Atchison, Topeka & Santa Fe.

The following officers were elected to direct the affairs of the association during the ensuing year: President, Mr. Blair; vice-president to serve for two years, C. G. Grove, chief engineer maintenance of way, Western region, Pennsylvania, Chicago.

The directors named were: W. C. Perkins, chief engineer, Union Pacific, Omaha, Neb.; R. J. Gammie, chief engineer, Texas & Pacific, Dallas Tex.; L. L. Adams, assistant chief engineer, Louisville & Nashville, Louisville, Ky.; and A. N. Laird, chief engineer, Grand Trunk Western, Detroit, Mich. Members of the nominating committee are: L. H. Powell, chief engineer, Atchison, Topeka & Santa Fe, Coast lines, Los Angeles, Cal.; L. H. Laffoley, engineer of buildings, Canadian Pacific, Montreal, Que.; H. E. Kirby, cost engineer, Chesapeake & Ohio, Richmond, Va.; W. G. Powrie, chief engineer, Chicago, Milwaukee, St. Paul & Pacific, Chicago; and E. J. Brown, engineer of track, Chicago, Burlington & Quincy, Chicago.

In addition, C. J. Geyer, vice-president—construction and maintenance, Chesapeake & Ohio, Richmond, Va., and vice-president of the association, was automatically advanced to senior vice-president, succeeding Mr. Blair.



This is the first step in applying the assembled manifold to acetylene cylinders. The use of flexible leads simplifies this operation

Secondly, fasten leads to the other cylinders. Remember that acetylene connections have left-hand threads

Correct procedures for flame-cleaning or flame-priming steel structures have, until recently, been disseminated largely in individual demonstrations and "by word of mouth." Following a demonstration of flame cleaning before a group of paint foremen on the Minneapolis, St. Paul & Sault Ste. Marie, it occurred to A. S. Krefting, principal assistant engineer of the road, that written instructions describing safe, practical and economical techniques of doing this work would be extremely valuable for initial instruction purposes and for future reference. Acting on Mr. Krefting's suggestion a set of such instructions was prepared by the Oxweld Railroad Service Division, Union Carbide & Carbon Corp. This article in two parts, is based on these instructions. Part I tells how to set up flame-cleaning equipment. Part II, to be presented next month, will tell how to do the work.—Editor

# Instructions Give Proper Flame-Cleaning Techniques

**Part I**

The third step is to apply the acetylene regulator and tighten nut with a wrench

• In preparing steel structures for painting, experience has shown that if the surfaces are intimately "scrubbed" with high-velocity, high-temperature, oxyacetylene flames, using special equipment developed for that purpose, all scale, foreign material and contaminants are loosened and can be removed quickly by a wire brush. Whenever such "scrubbed" surfaces are painted at once while the metal is at an elevated temperature, the preparatory process, even though it may involve the removal of rust and the old paint film, is called **flame priming.** When steel surfaces are cleaned in that manner but are not painted while still hot, the process is called **flame cleaning.**

Paint applied to steel that has been flame primed is generally conceded to have a superior corrosion resistance and an extremely high bond. The heat applied with the oxyacetylene flame not only drives off moisture and corrosive gases, but increases the mobility of the paint, causing it to flow easily into close contact with the sur-

Above—An adapter is required to connect the ½-in. hose to the regulator

Right—To blow out acetylene hoses with oxygen, hold the hoses in this manner

face. Furthermore, a low-temperature baking action is produced by the hot metal causing the paint to set up quickly and uniformly—on the surface of the steel first and on the surface of the paint last—resulting in a corrosion-resistant paint film.

To obtain safely the most effective results and lowest cost with the equipment that has been developed for this work, and to establish standardized practices in the use of the flame-cleaning and flame-priming processes by railway bridge-painting forces, few of whom have had previous experience with the oxyacetylene apparatus, the following instructions and operating procedures should be followed carefully.

### Setting up Equipment

The most economical method of supplying acetylene gas is to manifold not less than five cylinders of acetylene to provide a sufficient volume of the gas for efficient operation of the larger heads and to reduce delay occasioned by frequent changes of the cylinders. Manifolding of oxygen cylinders is usually not required, but should be given consideration if heavy usage of both gases is anticipated at a considerable distance from the gas-supply site and if frequent changes of oxygen cylinders would result in delays to the operation.

The daily requirements of acetylene and oxygen will, of course, be dependent upon the condition of the structure and the size and number of flame-cleaning heads which will be required to perform the operation most efficiently and at the lowest possible cost.

The location for the gas supply on the job should be selected carefully. The site should be accessible to transport, should provide a secure and solid mounting for in-service and standby cylinders, and should be arranged so that the cylinders can be lashed or otherwise fastened to supports to prevent damage or accidents. The five acetylene cylinders must always be used in an upright or standing position, and should be arranged with four cylinders set 90 deg. apart around a center cylinder. This arrangement requires an area approximately six feet square.

### Manifolds and Regulators

After the acetylene cylinders have been set up, the manifolding and regulating equipment must be applied and adjusted in four consecutive operations: (1) "Blow" or "crack" the cylinder valves; (2) apply the manifold; (3) attach the acetylene regulator; and (4) apply the adaptor. To "crack" (open slightly) each cylinder valve, first make sure that no open flames or source of ignition are nearby, then stand at one side of the outlet and, by means of the cylinder key, open the acetylene-cylinder valve one-quarter turn. Then close it immediately and repeat the operation for each cylinder. This "blow" will clear the valve of any dust or dirt that may have accumulated in the connection cavity. If this is not done, dirt might either mar the seat of the regulator-inlet nipple or be carried into the regulator and cause leakage or "creeping".

When all cylinders have thus been "cracked", **apply the manifold** by first fastening the flexible leads to the center block, then tightening the block to the central cylinder, remembering that all acetylene cylinder outlets and acetylene regulators have lefthand threads so that a regulator cannot be accidently connected to an oxygen cyl-

inder. Then connect the flexible hose leads successively to each of the four remaining acetylene cylinder valves. On completing t e manifold assembly, **attach the acetylene regulator** to the manifold post and tighten the connection nut with a standard wrench. An **adaptor is then applied** to the regulator outfit so the ½-in. hose can be attached to it. When this is done, **turn out** (counter-clockwise) the pressure-adjusting screw of the regulator until loose. This avoids abuse and possible damage to regulator and gauges.

At this point prepare the oxygen cylinder for use, first making sure there is no oil or grease on hands or gloves. Then "crack" the oxygen cylinder valve in the same manner as the acetylene cylinders.

**Left—To attach the supply hose to the regulator adapter use two wrenchs applied in this manner**

**Below—Apply soapy water with a paint brush to test for leaks, using an oil-free soap like Ivory**

When this has been done, connect the oxygen regulator to the oxygen cylinder—remembering, in this case, that oxygen regulators and cylinder-valve outlets have right-hand thread connections as opposed to lefthand threads for acetylene equipment. In attaching the regulator, run the valve connection threads freely by hand and then use a wrench only to tighten the nut and seal the joint. When the regulator is attached, turn out the pressure-adjusting screw in the same way as for the acetylene regulator.

### Attaching Hoses

Before any further preparations can be made, hoses must be attached to the regulators (or adaptors) and to the cleaning heads. Don't forget that **oxygen and acetylene hoses should never be interchanged** in service. To remind you of this warning, oxygen hoses are usually green, acetylene hoses are red; oxygen connections have right-hand threads, while acetylene connections have lefthand threads and a groove around the nuts to identify them.

### Blow Out New Hoses

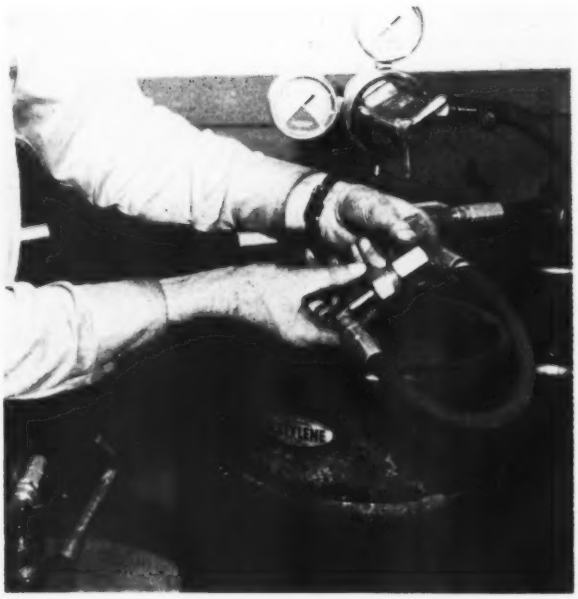
If a hose is new, blow it out. New hose is dusted on the inside with fine talc, loose particles of which must be blown out before the hose is attached to regulators or blowpipes. If in-service hoses have dirt in them, they too should be blown out. Both oxygen and acetylene hoses should always be blown out with oxygen—never with acetylene.

To blow out the oxygen hose, attach one end to the regulator, leaving the other end free. Open the cylinder valve just enough to allow the cylinder-pressure-gauge hand to move up slowly. When the gauge hand has stopped moving, open the cylinder valve fully. With this operation complete, the hose can be blown out by turning the pressure-adjusting screw clockwise, permitting oxygen to escape. Keep turning the handle until a pressure of about 5 p.s.i. shows on the low-pressure gauge. By this time the hose should be thoroughly clean and the handle can be turned to the left to stop the flow of oxygen.

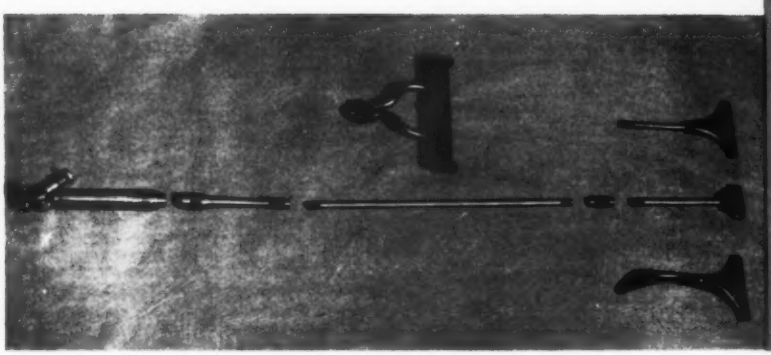
To blow out the acetylene hose, hold one end against the free end of the oxygen hose and repeat the above operation. After this has been done, however, residual oxygen in the hose should be blown out by putting one end of it to the mouth.

### Attaching Acetylene Hose

When attaching the ½-in. acetylene supply hose to the adaptor, two wrenches must be employed to keep from loosening the adaptor and making the joint leak. Use one wrench to hold the adaptor while the nut is tightened with the second wrench. In the event it is necessary to extend the hose lengths at any time, all connections must be tightened securely with the wrenches and must be inspected at regular intervals to detect



Above, left—If necessary to take one cylinder out of manifold, cap can be screwed on the flexible hose. Above, right—Five-cylinder manifold ready for service. Note that wrenches are on all cylinder valves



Left—Exploded view of a flame-cleaning blowpipe and flame heads. (L. to R.) handle, mixer, extension, tube, connecting nut, flame cleaning heads. At top is an 8-in. head

wear or damage that might cause leakage. The smaller-size, ⅜-in. acetylene leader hose should be securely attached to the ½-in. acetylene supply hose and both the oxygen and acetylene hoses attached to the blowpipe, again using two wrenches in order to obtain tight joints.

### Obtaining Working Pressures

Before opening the acetylene and oxygen cylinders both blowpipe valves should be closed to prevent leakage in case the regulators are not functioning properly. With hoses and mixing head attached, the next step is to open the cylinders and adjust the valves to provide correct working pressures.

In doing this for the acetylene cylinders, open the valve of the first cylinder slowly until the full cylinder pressure is on the regulator and continue turning the valve until it has been opened a total of 1½ turns only .Next open the remaining cylinder valves 1½ turns. This can be done without pause since pressure is on the regulator. After opening the cylinders, inspect all manifold joints, using soapy water only. Open the oxygen cylinder in the same manner as when the hoses were blown out, except, in this case, after opening the blowpipe oxygen valve, turn the handle of the oxygen-regulator pressure-adjusting screw to the right until the small pressure gauge indicates a pressure of 55 p.s.i.

With the blowpipe acetylene valve closed, turn the handle of the acetylene-regulator pressure-adjusting screw slowly to the right until the small gauge indicates a pressure of 3 p.s.i. Next open the blowpipe acetylene valve two turns and light the acetylene immediately at the head. Turn the adjusting screw handle to the left until the pointer or hand on the low-pressure gauge is slightly away from the pin, then extinguish the flame by closing the blowpipe acetylene valve.

### How to Ignite Cleaning Head

The oxyacetylene equipment is now assembled and ready to be put to use—except that the cleaning head needs only to be ignited. At the time that is desired, open the blowpipe oxygen valve slightly; open the acetylene valve fully and light the head using a blowpipe friction lighter. Then open the oxygen valve fully and adjust the acetylene valve, if necessary, to secure a neutral flame. In general this flame can best be obtained by first turning on excess acetylene, so as to show an acetylene "feather" extending beyond the inner flame cone, then reducing the acetylene until the "feather" disappears.

# Unloading Ballast For Power Tampers

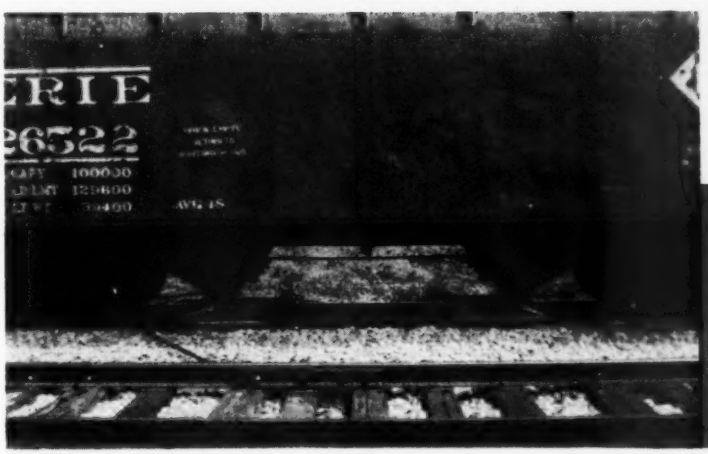
## *On the Erie*

• In carrying out power-ballasting operations on the Erie, as described in the January issue by Division Engineer Arthur Price, the procedure illustrated by the accompanying photographs is used for unloading and distributing ballast from hopper cars. The volume of ballast deposited on the track is controlled by chain load binders attached to the hopper doors. Distribution of the ballast is accomplished by the use of wood trays which, chained to the cars, slide along the rails under the hoppers. Each tray is constructed so that it extends 8 in. outside each rail and has a 4-in. opening on each side of each rail.

Above—In distributing ballast in advance of its power ballasting operations, the Erie obtains the result shown here through use of . . .

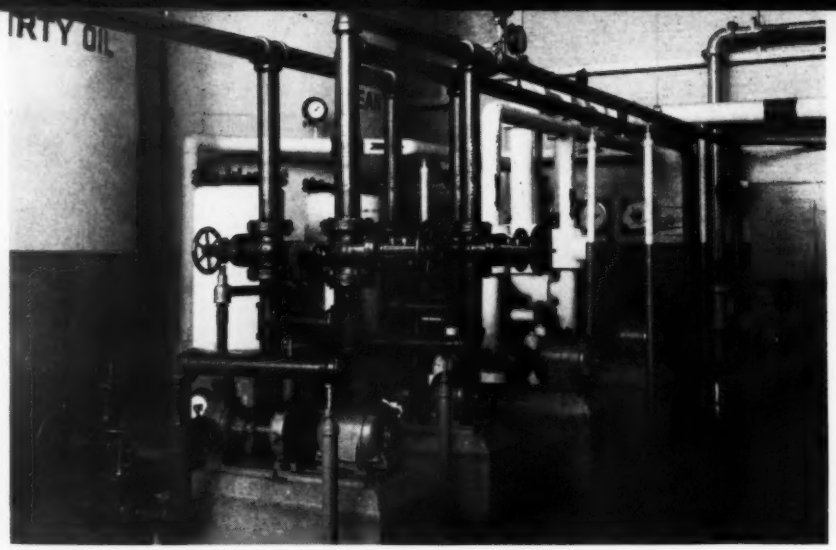
. . . wood trays of the construction shown at the left. These trays are chained to hopper cars and slide along the rails under the hoppers

Above—The volume of stone ballast deposited on the track is controlled by chain load binders attached to the hopper doors, as shown here




Left—Hopper car ready to be unloaded. A load binder has been attached to each hopper door and a tray has been placed under each hopper

**This is a report of a subcommittee* of the Committee on Water Service and Sanitation of the American Railway Engineering Association, which was presented at the recent annual meeting at Chicago. It discusses the character and arrangement of the pumps, piping and other facilities required for handling lubricating oil to and from diesel locomotives.**



A portion of the mechanical equipment for a lubricating-oil circulating system

# Design and Installation of

Bowser Xacto meter with ticket printer. The installation records the quantities of lube oil supplied to each locomotive

• Diesel lubricating oil facilities consist of one or more clean-oil supply and distribution systems, and dirty or waste-oil return systems. In general, the clean lubricating oil distributing systems include storage tanks, strainers, pumps, air releases, meters, valves, piping, storage loading stations and diesel locomotive filling stations. When various brands of oil are intended to be kept in separate storage, each brand of oil should have an entirely separate system.

The dirty or waste-oil return systems generally consist of diesel-locomotive drain stations, pumps, storage-tanks, valves, piping and storage-tank unloading stations for shipment to reclamation plants. Some railroads install their own reclamation plants; others pump the waste oil into storage tanks and use it as fuel, together with the regular fuel oil, for stationary heating boilers.

The size or capacity of storage tanks for diesel lubricating oil is governed by operating requirements, and whether the oil is to be purchased in barrel lots or in bulk carload quantities.

*G. F. Metzdorf, designing engineer, New York, Chicago & St. Louis, Cleveland, Ohio, was chairman of the subcommittee that prepared this report.

### Keeping the Oil Warm

Lubricating oil must be kept warm enough to pump properly in cold weather. When practical, storage tanks should be placed inside of heated buildings. Outdoor tanks exposed to cold weather must be provided with heating coils and temperature controls. In addition, the oil piping which leads to and from the tanks must be provided with steam tracers, traps, etc., all of which involve additional maintenance. The exposed above-ground tanks and pipe lines also require a protection of insulating material with a waterproof jacket.

Crankcase oil generally used for diesel locomotives is S.A.E. 40. The economical pumping temperature is usually 60 deg. F. to 100 deg. F., depending upon the length of the pipe line between the supply and the filling stations. Steam-heating coils placed inside of storage tanks must be controlled automatically to limit the temperature rise of the lubricating oil. High oil temperatures would create a hazard to workmen operating these facilities.

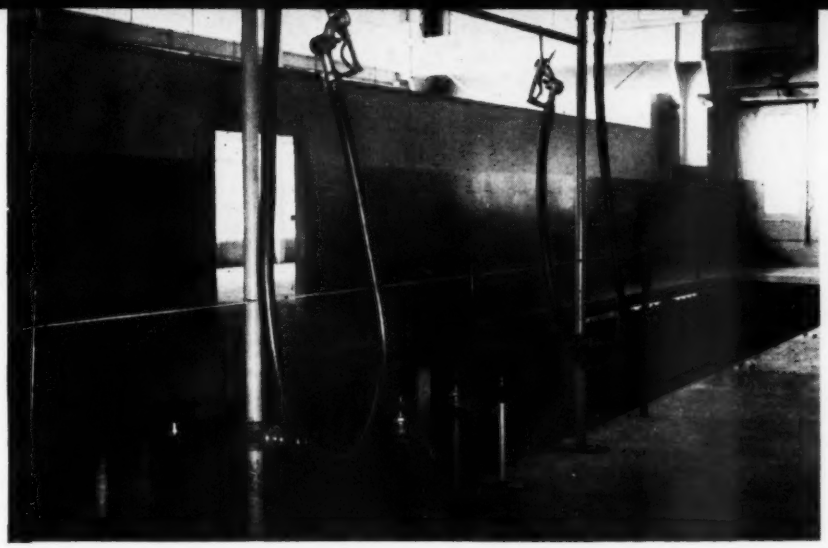
Each tank should be provided with a manhole, vent with flame arrestor, fill and discharge pipe connections, liquid level gage and base drain valve. The base drain valve, when not in a protected location, should be of a frostproof type. Swing joints should be installed near the pipe entrance to the tank, where the tank foundation is subjected to frost action or when it is necessary to relieve strain in the piping. Where oil flows by gravity from a storage tank, a shut-off valve should be placed in the line at the tank.

The filling of storage tanks is accomplished either by gravity flow from barrels placed on racks or fill boxes above the tanks, or by pumping from bulk carload. When pumping from bulk carload, the oil should be metered before it is discharged into storage tanks. The pumping arrangement from a tank car to the storage tanks is, in the order given, through an unloading station, strainer, pump, check valve, air release and meter, and in that order to the storage tanks. When unloading is done out of doors in cold weather, a steam connection to the tank-car heating coils is required.

The general sequence of pumping arrangement from the storage tank to the diesel locomotive is as follows:

(a) From a float or pipe suction in the tank through a strainer to the suction side of the pump.
(b) From the discharge side of the pump through a check valve and an air release, to a meter.
(c) From the meter to a lubricating station, with a hose connection having a shut-off nozzle at the delivery end.

At small installations where fill-



Outlets and connections for servicing diesels with lube oil, air, water and steam

# Diesel Lube-Oil Facilities

ing is intermittent, only one pump is required. Where pumping is required for filling storage tanks, the same pump is generally used for this purpose and for delivering the oil to locomotives.

### Use of Recording Meter

For large installations where filling is frequent and simultaneous, a meter is placed at each station to facilitate recording the quantities of oil supplied to each diesel locomotive. Two pumps are generally required for such installations, with piping and valves so arranged that the pumping operation can be switched from one pump to the other in the event of failure of either pump. The two-pump installation also permits the use of one pump for filling storage tanks from unloading stations while the other is pumping to diesel filling stations.

Crankcase capacities range from about 85 gal. for switchers to about 250 gal. for road locomotives. The flow required through the nozzle of the filling station is normally about 25 to 35 g.p.m. At large installations, throttling valves should be placed in each filling station standpipe for equalizing the rate of flow and to shut off the line when maintenance work on the filling hose or nozzle is required.

Pumps generally used for pumping lubricating oil are of the rotary, positive-displacement type, with a built-in by-pass relief valve, and are driven by an explosion-proof electric motor. The pump capacity required and the by-pass valve setting is governed by the anticipated number of filling stations to be operated simultaneously, the length and size of piping, and the temperature and viscosity of the oil.

### Methods of Control

The pumping of the oil to lubricating stations is controlled either by remote push-button stations or by an automatic pressure system. In the pressure system, the pump motor is automatically controlled by a pressure switch mounted on a pressure tank which holds a moderate supply of oil under pressure, ready for use. Unless the push-button station is provided with a timing device, the pressure system has an advantage over the push-button station in that it eliminates the possibility of a man failure in shutting off the pump.

The pressure tank is placed in the line of piping between the check valve on the discharge side of the pump and the air release. The capacity of the pressure tank is usually from 400 to 600 gal. A cut-in and cut-out setting on the pressure switch controls the operation of the pump motor. The range between the low, or cut-in, setting and the high, or cut-out, setting is generally not over 10 lb. Based on the assumption that the rate of flow to each filling station is balanced by throttling valves, the high-pressure setting is governed by a maximum desired flow, and the low-pressure setting by a minimum desired flow, through the station having the greatest flow pressure loss through the piping, with the throttling valve in a fully-open position at that station.

### Other Provisions

In addition to the pressure switch, the pressure tank should be provided with a pressure-type access cover, pressure gage, pop safety valve, liquid level gage and tapping for inlet and outlet oil piping and a compressed air connection; compressed air being used for make-up for air for initial charging of the pressure tank. The initial charging is accomplished by first filling the pressure tank about 2/3 full with lubricating oil and then charging the tank with air to a pressure equal to that of the pump cut-out pressure setting.

By-pass piping with a shut-off valve arrangement should be installed around the air release, meter and pressure tank to facilitate repairs to or the replacement of this equipment. Where the meter is placed at the diesel filling station, only the throttling or shut-off valve is required, which should be placed in the line just ahead of the meter. A shut-off valve should be placed in all branch lines adjacent to the main run.

### Waste Pumping Sequence

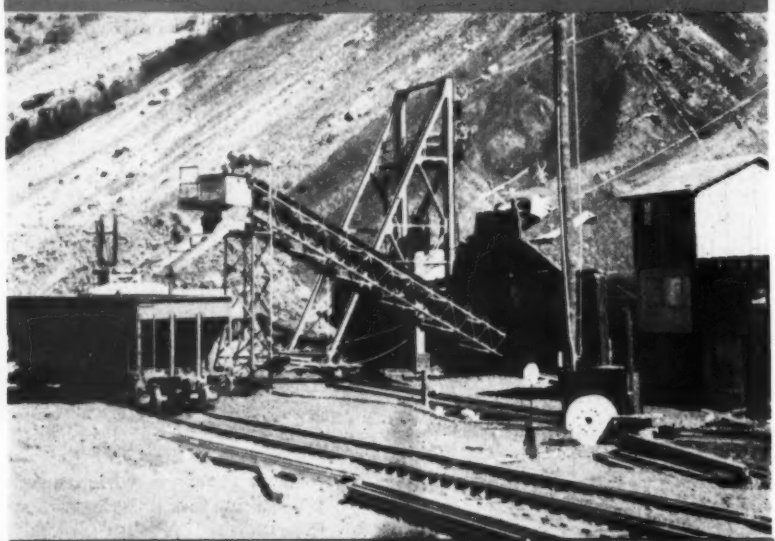
The general sequence of a waste pumping arrangement from diesel locomotive drain stations to a storage tank is as follows:

(a) By gravity flow through a hose connection at the drain stations, to a sump receiving tank provided with a float switch for control of the pump motor.
(b) Then through suction pipe, check valve, and strainer to pump.
(c) From pump discharge to storage tank.

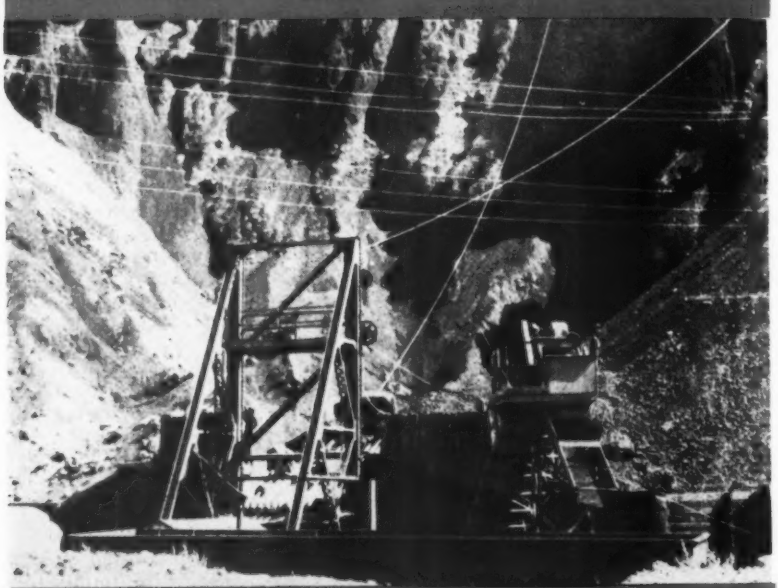
The pump that is used for delivering waste oil to a storage tank may also be employed to pump the oil from the storage tank to a tank car or other loading station. This is done by having the piping and valves so arranged as to shut off the sump suction and to draw oil from the waste-oil storage tanks at the suction side of the pump, then discharging the oil through a branch line to the various unloading stations.

# Santa Fe Takes Ballast from Extinct Volcanos

**Satisfactory ballast is obtained from a hill composed of volcanic cinders. A simple mechanical plant, capable of being moved as necessary, brings the material from the hill, screens and loads it into 100-yd. gondolas**



General view of screening and loading equipment showing the steel headframe, belt conveyor, loading chute, timber bulkhead and the building which houses the hoist



The 6-cu. yd. dragline bucket can be seen in its dumping position at the top end of the grizzley bars. Cables running through the pulleys on the headframes are the inhaul and backhaul lines connecting with guide towers near the top of the hill

**Main part of the Santa Fe's volcanic . . .**

• At Winona, Ariz., the Atchison, Topeka & Santa Fe is operating a mechanized pit from which about 200,000 cu. yd. of ballast are obtained annually. This ballast consists of cinders of volcanic origin, and comes from one of the many hills that surround the San Francisco peaks which at one time were active volcanos. The use of these cinders as ballast has proved very satisfactory on the road's Albuquerque division, about 90 per cent of which is ballasted with such material. This division is situated in the western half of New Mexico and across Arizona, a territory having a very low rainfall. The cinder pit is located near the middle of Arizona.

Previous to 1946, tests were made which showed the hill from which the cinders are now being obtained to consist almost entirely of volcanic cinders to a depth of 90 ft., with an overburden varying from 6 ft. in depth at the bottom to 1 ft. at the top of the hill. Pit operations were started in June, 1946, using 1-cu. yd. shovels to load the material directly into ballast cars. Later, a dragline assisted in the loading. However, with this direct-loading method, it was impracticable to exclude the large boulders that are scattered throughout the hill. When the cinders were unloaded on the track to be surfaced, the boulders sometimes became lodged in the car openings. The consequent loss of time in unloading the cinders, together with the removal later of the useless boulders from the track, resulted in raising the cost of this type of ballast.

After a year's operation with the power shovels and a dragline, it became evident that in another

. . . cinder ballast pit. Cone shaped excavation is where dragline has been working

year the unstable working face of the cinder hill would be too high to permit the use of this type of equipment safely. As a consequence Sauerman Brothers, Inc., cableway excavating experts, were employed to make an inspection of the plant and operation in June, 1947, which resulted in the development of the mechanized equipment now in use.

### Equipment Described

This equipment consisted essentially of a 6-cu. yd. dragline bucket, cableways with the necessary towers, a hoisthouse and machinery, hoppers and loading conveyors. The plant is served by two tracks built on a grade and parallel with the length of the hill, the two tracks becoming a single track immediately in front of the plant. A timber bulkhead was constructed near the toe of the hill to permit piling the cinders above the hoppers and also to protect the lower units from rolling rocks.

The dragline bucket is suspended on cable lines reeved between pulleys on a steel headframe at the bottom of the slope and on guide towers and bridle cable towers up on the side of the hill. These towers are of wood construction, anchored by deadmen, and are easily moved to new positions when necessary. The bridle frame is shifted back and forth on the bridle cable, which positions the bucket so that cinders can be excavated on a wide angle from the headframe. The bucket is moved by a 1-in. inhaul cable, a ⅞-in. backhaul cable and a ⅞-in. shifting cable, all operated from a three-drum hoist powered by a 150-hp. electric motor. The steel headframe is also movable and is weighted down with a large number of scrap rails. With this arrangement, all equipment can be readily moved to a new location whenever as much excavating as possible is done from one set-up.

Directly in front of the steel headframe, with one side attached to the frame, is a large hopper into which the cinders are dumped by the bucket. Above the hopper are two sets of grizzly bars for screening the cinders as they are dumped. The upper grizzly consists of 132-lb. rails, spaced 7 in. apart, and sloping down from the pit side. These prevent the boulders and large rocks from passing into the hopper. The lower grizzly is made up of three banks of steel bars, each overhanging the other, so that rocks falling through the upper grizzly will be screened out if they are greater than 2½ in. in size. The lower grizzly bars are fastened only at their upper end so that they can vibrate as the rocks strike them, thus assisting in the downward slide of the rocks to the discard pile. Usually, these grizzlies unload themselves, although at times it is necessary to remove large flat rocks by hand from the upper grizzly.

The screened cinders passing into the large hopper fall upon a 36-in. apron conveyor and are carried up 5 ft. to one side to drop onto a 30-in. belt conveyor. The belt conveyor, in turn, carries the cinders up towards the loading track and dumps them into a small hopper from which they slide down a chute for loading into ballast cars.

The rocks and boulders screened out by the grizzlies fall between the supporting legs of the headframe. They are removed as necessary by a 1-cu. yd. dragline bucket, powered by a small double-drum hoist, which piles them along the toe of the hill away from the plant, where they are later loaded into air-dump cars by a power shovel and used as rip rap.

Ballast cars are pushed up above the loading chute once a day by a work train, and are let down to the chute by hand braking. As soon as a car is loaded, it is allowed to travel by gravity down the plant spur to make room for other cars to be loaded. The maximum output for one 8-hr. day has been 20 cars of 100-yd. capacity, or a total of 2,000 cu. yd. Output since the pit opened in June, 1946, and the means of excavation, are as follows:

| Year | Cu. Yd. Cinders | Method of Excavation |
|---|---|---|
| 1946 (6 mo.) | 146,820 | 1-yd. shovels (3) |
| 1947 | 305,910 | " |
| 1948 | 322,195 | " |
| 1949 (5 mo.) | 29,000 | 1-yd. shovel |
| 1949 (7 mo.) | 182,110 | 6-yd. dragline |
| 1950 (9 mo.) | 137,800 | " |
| Total | 1,123,835 | |

The above figures, however, do not represent the maximum potential output of the excavating methods, because the output has varied with the demand for ballast. The Winona pit produces ballast solely for the Albuquerque division and, as it is impracticable to store ballast, it is produced only as required by that division. During the winter it is necessary to close down the operation at the pit a great deal of the time because of snow and cold weather. Hence, it is only during the summer that maximum output is attained. The maximum output for any one month was reached in August, 1949, when 52,010 cu. yd. of ballast were produced.

A cost analysis indicates that the dragline method of loading cinder ballast in cars produces the lowest cost per cubic yard. The screening of this pit-run material through the grizzly bars yields a further saving by eliminating the difficulties formerly experienced in unloading the ballast.

The cableways, hoists, buckets, headframe and pulleys were manufactured and supplied by Sauerman Brothers, Inc., Chicago. The hoppers, conveyors and the framework to hold them were manufactured and supplied by the Link-Belt Company, Los Angeles, Cal. The timber bulkheads were installed by the railroad.

This view in a tunnel was taken when the traveling staging had been moved backward to permit blasting from roof to be undertaken. Note temporary steel ties holding the two footings of traveling staging together while it is being moved

# Getting More Elbow Room

**The highlights of this article, which describes the difficult and costly improvement work that has been carried out on two mountain lines to remove "infringements", are the details given of the novel methods and equipment employed to enlarge several double-track tunnels and to daylight two other tunnels. All of the work was done under traffic, with only periodic "traffic or occupational blocks".**

**By N. M. Thadani**
Deputy Chief Engineer
Great Indian Peninsula Railway
Bombay, India

• The Great Indian Peninsula Railway, on its broad-gage, mountainous lines out of Bombay, India, has recently finished a multi-million dollar program of line relocation, widening of track centers and enlarging tunnel clearances, which involved many interesting problems and many novel engineering features in their solution. Within approximately 27 mi. on two sections of line the major work included the building of 6.6 mi. of new line; the construction of 10 new tunnels with a combined length of 9,095 ft.; the widening of 4,120 ft. of tunnel in 7 tunnels; and the daylighting of two tunnels with an aggregate length of 482 ft. Of special interest are the tunnel-widening and daylighting methods employed (under traffic), and the special equipment developed for and used in these two classes of work.

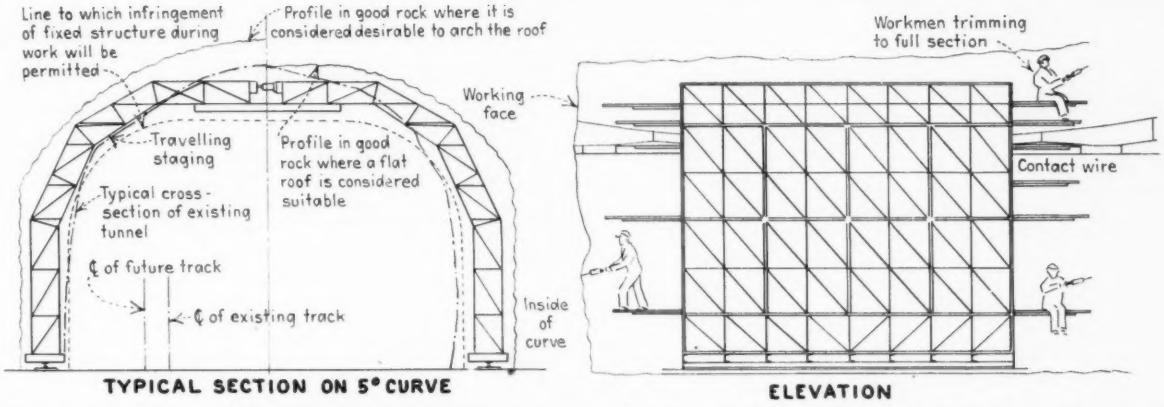
## Mountainous Lines

The land on the west coast of the Indian peninsula for about 35 to 45 mi. inland rises suddenly from the coastal plain-called the Konkan plain—on a sharp escarpment almost parallel with the coast, in a range of hills known as the Western Ghats. In the old days this mountain range presented a serious barrier to land transport between Bombay and the fertile and otherwise rich territory on the Deccan plateau. The Great Indian Peninsula Railway ascends this mountain range with two of its main trunk lines—one of which, its South-East main line, ascends the Bhore Ghat incline, while the other, its North-East main line, climbs the Thull Ghat incline.

Starting at Victoria terminus in Bombay, the Great Indian Peninsula, traversing a portion of the Konkan, reaches the junction station of Kalyan at a distance of 33 mi. from Bombay. From this point the two trunk lines take off, one in the southeastern direction, up Bhore Ghat, to Poona and Madras, and the other in the northeastern direction, up Thull Ghat, to Igatpuri and further north to Delhi.

The South-East line starts from Karjat, at a level of 169.22 ft. above sea level, and reaches Lonavla at a height of 2033.48 ft. above sea level. The Bhore Ghat incline is nearly 17 mi. in length, with

**Cantilever-type staging in position in a tunnel where widening was necessary on only one side. This staging was mounted on wheels**


Line to which infringement of fixed structure during work will be permitted
Profile in good rock where it is considered desirable to arch the roof
Working face
Travelling staging
Profile in good rock where a flat roof is considered suitable
Typical cross-section of existing tunnel
℄ of future track
℄ of existing track
Inside of curve
TYPICAL SECTION ON 5° CURVE
Workmen trimming to full section
Contact wire
ELEVATION

**Cross section and elevation of the traveling staging used in enlarging tunnel clearances. The design of the staging permitted making an adjustment of 2 ft. 6 in. in the distance between the base supports and between the upper center sections**

# on the Great Indian Peninsula Railway

curves as sharp as 5 deg. and gradients as steep as 1 in 37, or 2.7 per cent. On this section there are 27 tunnels and a number of high viaducts.

The North-East line, ascending Thull Ghat, is situated between Kasara and Igatpuri, and is nearly 10 mi. in length. Thull Ghat differs materially from the Bhore Ghat in that a gradual ascent is possible from the coastal Konkan plain at Kalyan to the foot of the ghats at Kasara. Kasara is at an elevation of 947.84 ft. above sea level, while Igatpuri is at an elevation of 1917.84 ft., so that the North-East line ascends only 970 ft. compared with the 1864.26 ft. on the Bhore Ghat.

### Serious Clearance Restrictions

Both the inclines were constructed in the 1860's for double track and were regarded at the time as remarkable feats of railway engineering, surveying and construction. The tracks on both the ghats were electrified in 1928. The tracks were, however, laid at 12-ft. centers, providing a clear space of only 6 ft. between them (no doubt, a copy of the British six-foot).

For years the close spacing of tracks on these two ghats has constituted a serious infringement on standard clearances, which has not only prevented the movement of "out-of-gage" loads on the ghats, but has generally restricted the free movement of heavy traffic. The removal of restricting clearances on these ghats has, therefore, been a matter of urgent practical importance, a fact that has been recognized for a long time. As early as 1926 a survey for the removal of these infringements was undertaken and a project scheme prepared.

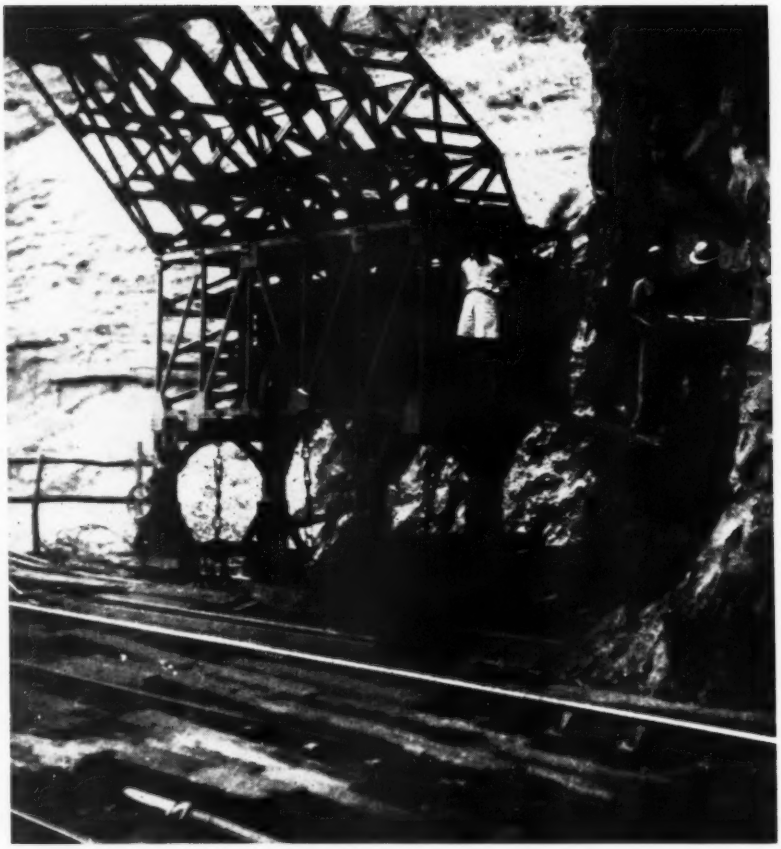
The problem involved in removing these infringements was to widen the track centers from 12 ft. to 15 ft. 6 in., with the usual allowances for curvature, and to provide increased clearances in tunnels in accordance with standard dimensions. Detailed investigations as to the most suitable and economical methods of carrying out this work extended over a fairly lengthy period. As regards the tunnels, these investigations were directed chiefly to devising methods of removing clearance restrictions, rather than to relocating lines around the tunnels, which was found to be very expensive, and in some cases even impracticable, owing to the necessity of spanning deep valleys and to unfavorable foundation conditions.

The investigations indicated that a suitable method could be evolved for enlarging the tunnels without interfering with traffic. Also, in certain cases where the overburden was small, it was found to be practicable and cheaper to "daylight" the tunnels—convert them into

open cuts on the existing alinement—and a suitable and feasible method was evolved for carrying out this work.

Each location and problem was studied separately and the most economical and practical method was decided upon in each zone. Thus, the work of removing infringements fell into several categories—the widening of existing embankments and cuts and the extension of bridges on the existing alinement; the widening of existing tunnels under traffic on the existing alinement; the converting of tunnels into open cuts; and the relocating of one of the tracks in diversions round existing tunnels.

Because much of the work involved was necessarily done in close proximity to running tracks, it was carried out departmentally with railway labor, machines, tools and supervisory staff. Only the construction of new line diversions was carried out under contract.



**Close-up view of the base of the cantilever staging. Note men drilling tunnel side**

### Widening of Tunnels

The first tunnel to be widened, which involved a 5-deg. curve, was No. 9 on Thull Ghat. This tunnel was widened almost equally on both sides. It was first hoped that by gauntleting the tracks and introducing single-track work, it would be possible to widen this and certain other tunnels by means of a traveling shield, behind which blasting and mucking operations could be carried out without interfering with traffic. This, however, was found to be impracticable, as the chief transportation superintendent was unable to grant occupation periods, or "blocks", in which blasting could be permitted, even with a shield, if single-line working was introduced.

The problem, therefore, was to carry out widening of the tunnels without interfering with double-line traffic, except during periods of occupation blocks. This was done by establishing side limits inside which it was considered that no temporary structures or scaffolding could be allowed to infringe, and outside which all work would have to be carried out, except during periods of occupation blocks.

The first problem under this arrangement was how to support the men engaged in drilling the rock for the new tunnel section. Temporary scaffoldings, to be erected and then removed during each "block", were considered impracticable and dangerous to the drillers. It was decided, therefore, to construct a traveling steel staging which would support planks from which the drillers could operate at any desired point of the new tunnel profile. This staging had to be inside the dimensions of the final tunnel profile, and outside the minimum clearances mentioned above, so there would be no interference to traffic, and so there would be adequate clearance inside the staging for running trains and for contact and catenary wires.

Tunnel No. 9 is partly on tangent and partly on a curve of 5 deg., so the profile of the finished tunnel was to vary from the former to the latter throughout the length of the transition curve, and the location of the free working area on each side was to vary accordingly. To take care of this situation a staging was designed which permitted an adjustment of 2 ft. 6 in. in the distance between the base supports and between the upper center sections. The design, as adopted, is shown in the accompanying drawing, which also shows the method of operating from the staging. Since the staging simulates a three-pinned-arch, careful attention had to be paid to the lateral support of the base while in the working position. While traveling, the two base sections had to be tied together, which means that this could be done only when the tunnel was closed to traffic.

In widening the tunnels, the drillers, standing on planks over the steel traveling staging, drilled holes about 6 ft. deep in the rock side walls. This work could be done even without an occupational block, except when trains were actually passing through the tunnel, without in any way interfering with traffic. Such drilling, however, was only permitted up to a certain height, called "the danger line," beyond which no drilling was permitted unless electric power in the overhead wires had been cut off. Drilling in the roof, of course, was done only during traffic and power blocks. Actual blasting in rock for widening was done only during occupation blocks. Normally, two occupation blocks,

**Crane and cradle dismantling the lining of one of the tunnels that were daylighted**

each of about 2½ hr. were available each day. In this manner, the blasting of rock and the widening of the tunnel were carried out in stages, and continued progressively throughout the length of the tunnel.

When undertaking the enlargement of Tunnel No. 9, which was completed in August, 1948, only one staging was placed in operation—from the Igatpuri end of the tunnel. Later, a second arch staging was installed at the Bombay end of the tunnel and the widening work was carried out simultaneously from both ends. The average progress was one running foot of widening per staging per day. The operations were hampered due to the irregularity of occupation blocks, as almost all the main-line trains of the GIP pass through Thull Ghat section.

For work on Bhore Ghat, where most of the tunnels had to be widened on one side only, a different design of staging was developed and utilized. This staging was of the cantilever type, and the design involved the use of a rail counterbalance to the extent of 12 tons, to offset the overturning tendency due to the overhanging part of the structure. This staging was mounted on wheels to facilitate its movement as work advanced in the tunnel. Daily progress of two running feet of widening was maintained with this staging.

## Daylighting of Tunnels

In daylighting the two tunnels on this project—one 402 ft. long, and the other 85 ft. long—the top width was first marked on the hilltop over the tunnel. Removal of the earth overburden was carried out by hand excavation until rock was exposed. The overburden in rock was then carefully removed by blasting with explosive charges under occupation blocks, when electric power was also cut off. This process was carried out until the rock over the top of the tunnel lining was reduced to a thickness of eight feet.

The remaining rock over the lining was carefully removed in shallow stages by blasting with gentle charges, and by the use of paving breakers. Thus, eventually all the overburden was fully removed, leaving the masonry lining alone to be disposed of.

## Special Cradle Used

The removal of the masonry arch of the lining was an intricate and delicate operation, which had to be carried out without interrupting traffic and without endangering the safety of life or railway equipment. This was done by means of a cradle specially designed and actuated by a locomotive crane.

The cradle itself is a big hook, with a timbered platform, 5 ft. by 6 ft. in dimensions, supported on cross girders and designed to fit the intrados of the arch lining. Lifted by the crane, the cradle would engage voussoirs, involving loads up to 12 tons, and lift them up bodily. By this means the crown voussoirs were taken out neatly for a length of five feet back from the face. After this operation it was expected that the haunches would fall in, but this did not happen. Removal of the arch haunches, therefore, was done by manipulating the cradle in such a manner that its axis was at right angles to the axis of the tunnel.

Piece by piece the masonry in the hanging haunches was thus removed from both sides. Later, the removal of the remaining haunch masonry was carried out by means of light explosive charges, placed in holes about 18 in. deep on an average, spaced 2 to 3 ft. apart and placed in a diamond pattern. Each hole was charged with about 10 oz. of gelignite, and ignition was by means of safety fuses and detonators. The holes were fired at definite intervals. The cantilevered haunches fell off piece by piece, and further charges placed in the bench close to the springing removed what was left of the lining, cutting it off neatly at the springing lines. In the case of the 85-ft. tunnel that was daylighted, the entire masonry arch was removed in about two week's time.

Removal of the side lining was done by taking it down in stages, and was a comparatively easy task. The sides of the cut were then trimmed of all loose rock and overhangs, and neat side drains were blasted out to provide adequate drainage for the tracks at the new standard spacing.

# WHAT'S THE ANSWER?

**An open forum for maintenance men on track, bridge, building and water service problems**

## Cleaning Ballast in Long Tunnels

What are the most satisfactory methods of cleaning or removing foul ballast from long tunnels? Can such ballast be removed efficiently and economically by power-driven equipment? If so, how? Is the length of tunnel a factor? Explain.

### Remove and Replace Ballast

By R. D. Simpson
Maintenance Engineer, Norfolk & Western, Roanoke, Va.

Being located in mountainous terrain our road requires a great many tunnels, but we never attempt to clean ballast in them. Long tunnels are usually very wet and dirty and in those that do not have concrete bottoms and ballast retaining walls, we find that mud usually works up from the bottom, turning the ballast into a sticky mass. So far as I know, there are no machines on the market that will clean such ballast. Therefore there is nothing left to do except to remove the foul ballast and replace it with clean stone. It is also our practice to remove the ballast from those long tunnels which have concrete bottoms and ballast retaining walls. Whether it costs less to clean the stone or remove and replace it in tunnels is debatable, but the latter practice speeds up the work to such an extent that we feel it is justified. Short tunnels are usually dry enough to present no particular problem, because the ballast in them can generally be cleaned satisfactorily with Moles in the course of regular ballast programs.

In working our long, double-track tunnels, foul ballast from both tracks is thrown into the intertrack space, loaded with a large clamshell into low-side gondolas, and then moved by work train to a disposal point. In single-track tunnels, where clearances are more limited, half of the foul ballast is cribbed out on each side of the track and then loaded by means of a small clamshell bucket into 4-cu. yd. dump cars or onto flat cars equipped with side boards. It is then moved by the work train to the point of disposal. Heretofore, to place the stone where it can be handled by clamshell, it has been dug or forked out of track by hand. We believe this work can be done much more economically with a cribbing machine and we plan to use such a machine in the future in tunnels where there are no ballast retaining walls to interfere, and where adequate ventilation will permit the use of internal combustion engines.

The length of a tunnel affects the economics of removing ballast especially where clearances and safety make it necessary that men leave the tunnel for trains. However, in tunnels that are provided with sufficient clearance to make removal of the men unnecessary, the length of the tunnel is no factor of any consequence.

### Conditions Alter Methods

By General Roadmaster

Methods and equipment that are effective in cleaning ballast in one tunnel may not be suitable in another. Hence, local conditions will usually govern the planning of such work, the simplicity of which will be in direct proportion to the tunnel's length. Other problems involved include suitable ventilation, lighting, side clearance, wet or dry conditions, drains that

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**Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 79 W. Monroe St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.**

## To Be Answered In the June Issue

1. What, if any, benefit is derived by following the almost universal rule that the heart side of ties must be turned down when they are put in track? Explain.

2. Should galvanized iron roofing and siding on buildings be treated and painted as soon as erected or should this material be allowed to weather a period of time before being painted? Explain.

3. What rules or specifications govern the provision of bumping posts on industry tracks? Is there a hard and fast rule governing the distance between the striking plate of the post and buildings or other structures beyond the end of the track? Explain.

4. What is the best method of protecting the heads of precast reinforced-concrete piles to prevent injury during driving? Explain.

5. What makes track get muddy? What is the origin of the material that causes the mud? What methods are most effective in preventing the development of this condition? Explain.

6. Under what conditions should underground pipe lines be protected from corrosion? What methods are available for this purpose? Explain.

must be kept open, the method of disposing of foul ballast and waste, the density of traffic and methods of clearing for trains.

Ballast-cleaning machinery and other smaller machines, such as cribbers, small cranes, lighting generators and belt conveyors are available for cleaning or removing ballast but because these machines are mostly driven by gas engines there is a hazard from carbon monoxide unless there is a good draft through the tunnel to provide ventilation.

In carrying out tunnel work in which the overhead clearance is sufficient and the ballast is not muddy, I would give the track a lift on the present material, using it for sub-ballast instead of removing or cleaning it. This would be the most economical way of using the old material. This operation should be followed by a second lift on new crushed-stone ballast. If the overhead clearance is not sufficient to permit this procedure, I would crib out the track, using cribbing machines if the ventilation is sufficient. After that, the old shoulder ballast could be loaded. To do this, I would recommend using a small on-track crane, such as a Burro, with a clamshell and an air dump car into which the foul material could be loaded. In this operation the crane can be used to load the material into the dump car and haul it to the end of the tunnel to be wasted on an adjacent fill. We have handled two of our recent tunnel jobs by this method with excellent results.

In another tunnel we entirely renovated the track by removing all ballast, replacing all ties, installing continuous welded rail and finally giving the track a 6-in. lift on crushed-stone ballast. This tunnel was about one mile long and had good ventilation which minimized the danger from carbon monoxide fumes. To provide light we used gas-engine driven generators. A work train was made up into which was incorporated various units of machinery. As a part of this outfit, we mounted a 50-ft. belt conveyor on a push car, to which we coupled an air dump car and a flat car. This equipment was handled into the tunnel by a small diesel switcher. Starting at one end of the tunnel the work progressed toward the other end, removing all ties, and loading them on the flat cars. The old ballast was then loaded by hand onto the belt conveyor which carried it into the dump car. Following this operation new ties were placed on the leveled roadbed and enough crushed rock ballast was unloaded to fill the cribs between them. When the cleaning operation was completed and the new ties had been placed, the old rail was replaced with continuous welded rail on new double-shoulder tie plates. When the rail had been relaid, the track was given a 6-in. lift on crushed rock.

In the majority of tunnels, crushed stone ballast should remain in good condition for a long time unless there is a local situation which causes it to foul up. There is no wind-blown dirt, no plant life, bug life, or animal life to hasten the fouling of good ballast, and unless the tunnel is on a grade where locomotives use sand, the ballast should not have to be removed or cleaned for a considerable length of time. This is substantiated by a report of a recent inspection of the Cascade tunnel which is more than eight miles long. In this inspection it was found that the ties originally installed in 1921 were almost as sound as new ties and the crushed or washed-stone ballast was in excellent condition.

# Using Motor Cars on Self-Guarded Frogs

Why do track motor cars sometimes derail at self-guarded frogs? What can be done to prevent these derailments? Explain. To what extent would motor-car wheels with treads conforming to "MCB" standards be practicable for this purpose?

## Wider Wheel Treads Needed

By C. L. Fero
Supervisor Work Equipment, Boston & Maine, East Cambridge, Mass.

The tread of present motor car wheels measures 3¼ in. in width, whereas the "MCB" standard wheel tread is 4 in. wide, or a difference of about ¾ in. The distance from the side of the point to the wheel guard on a self-guarded frog directly opposite the point is from 4⅛ in. to 4¼ in. About 6 in. ahead of the point the guards widen to about 4⅜ in. from the theoretical side of the point to the guard.

The flange of a 16-in. motor-car wheel approaching the point of a self-guarded frog in a facing point movement will strike the frog point when the center of the wheel is about 6 in. away from the point, where, as pointed out, the guards widen out just ahead of the point. As the frog guard wears, which it does readily in busy yards, the condition is aggravated and becomes more likely to derail motor or push cars.

The obvious remedy for this dangerous condition is, of course, to provide a motor-car wheel with a tread at least 3¾ in. wide so that the outer rim will force the flange of the wheel beyond the point.

Some motor-car manufacturers furnish extension rims made of ¼-in. by ¾-in. angles which can be bolted to the outside of the wheel to widen the tread to the "MCB" standard of 4 in. Another method which has proven satisfactory is to roll a ring or hoop of 5/16-in. by ¾-in. flat steel to an outside dimension corresponding to the wheel-tread diameter and electric weld this hoop to the outside of the wheel.

## Wheel Treads Are Too Narrow

By Track Supervisor

Self-guarded frogs are designed so that the wheel guards will, by bearing against the outer rim of wheel treads, force the flanges past the frog point. These wheel guards are placed to conform to the 4-in. width of the standard "MCB" wheel tread. However, the width of motor-car wheel treads is only 3¼ in. Thus, under certain conditions, when a motor car is moved into a turnout equipped with a self-guarded frog, the rim of the wheels bear against the wheel guards, but, in that position, the flange cannot clear the frog point. A derailment results.

It is clear that if motor cars are to be operated over self-guarded frogs safely, the wheel treads must be as wide as those which the frog wheel guards are designed to pro-

tect—"MCB" wheels. However, it is not necessary to make motor car wheels conform to all the requirements of "MCB" wheels, but only to the width-of-tread dimensions. For instance the so-called "coning", or 1 in 50 slope, of "MCB" treads has no bearing on this problem and should not be built into motor-car wheels. In other words, to stop derailments and make it safe to operate motor cars over self-guarded frogs, it is only necessary to use wheels with treads 4-in. wide.

# Low-Water Alarms at Water Stations

Under what conditions are low-water alarms needed at out-of-the-way water stations? What methods of installation are most effective? Explain.

### Blinker Lights Are Helpful

By E. R. Schlaf
Assistant Superintendent, Water Service, Illinois Central, Chicago

The 40-hr. week has made it highly desirable to convert manual or semi-automatic water stations to fully automatic installations. This has brought with it the problem of providing low-water alarms in out-of-the-way places, where no attendants are nearby.

One method which has been tried and seems to have merit is a device consisting of a float switch in series with a blinker type of light powered by dry batteries in a self-contained case. The blinker light may be equipped with any color lens desired, but a clear lens is recommended. The unit is mounted on top of the tank, or any other suitable location where it may be noticed by engine crews either of passing trains or of those stopped for taking water. Bulletins are issued to crews to report low-water conditions to the train dispatcher.

The batteries are rarely called upon for use, but are capable of several hundred hours of continuous operation. This is possible because of the extremely short duration of the intermittent flashes. Batteries normally are renewed because of age rather than use. A test circuit may be installed for checking by maintainers.

One of the causes for low-water condition is failure of power transmission lines. The use of alternating current in the alarm circuit would therefore result in a failure of the low-water alarm when needed most. For this reason batteries are used.

# Caps in Treated Timber Trestles

In treated timber trestles, what are the advantages of caps made up of two pieces of timber 8 in. by 16 in. or 7 in. by 16 in., placed on edge and bolted together, as compared with the usual 14-in. by 14-in. solid caps?

### Two-Piece Caps Preferable

By G. V. Guerin
Bridge Engineer, Great Northern, St. Paul, Minn.

Prior to 1926, the Great Northern built only untreated, open-deck timber trestles which included either pile or frame bents as may have been required. It was found that a short time after installation, the 14-in. by 14-in. untreated caps on the pile bents in particular were check splitting at about the center of the top horizontal faces. This condition resulted in rapid development of interior decay, with the result that the average life of these caps was only about 10 years.

In 1926 standard plans were prepared for treated-timber pile trestles with ballast decks. To overcome the check splitting of the one-piece caps and to secure better protection from the treatment, the caps were designed to consist of two 7-in. by 14-in. pieces bolted together and placed on edge. It was found that this type of cap could be installed easily and these two-piece, treated-and-bolted caps were adopted as standard for our untreated, pile-trestle bridges early in the 1930's.

In 1936 the size of the two-piece, treated - and - bolted cap was changed to consist of two pieces, 8 in. by 16 in. Most of the piles being furnished had butt diameters of at least 16 in. at the cut-off, and the stringers installed in most of the pile trestles were 8 in. by 16 in. by 14 ft. and 28 ft. in size. This larger cap was adopted to take advantage of the increased pile bearing area afforded and to simplify our bridge timber stocks.

The 8-in. by 16-in. treated timbers for two-piece caps on pile trestles are surfaced on edge to the definite dimension of 15¾ in., the same as the stringers. For frame bents with 12-in. by 12-in. posts, two-piece treated-and-bolted caps and intermediate and bottom sills, 6-in. by 12-in., surfaced on one edge to 11¾ in., are used. All of these timbers are specified to be select structural grade, but in times of great demand inferior grades must sometimes be accepted. In these instances it is our opinion that the two-piece bolted caps and sills are superior in strength to equivalent single-piece members.

The two-piece, treated-and-bolted caps have been very successful, and it is anticipated they will last the entire life of the bridges, including those with all piles and timbers treated. There is no record of any of the two-piece caps installed since 1926 having to be changed out because of decay. Based upon our 25 years of experience, we consider the use of two-piece caps to be the most outstanding improvement in timber-trestle bridge design made in a number of years. Similar designs have also been adopted for other structures. As an example, 4-in. by 12-in. treated timbers spiked together are now used for roofs on snow-sheds in place of 12-in. by 12-in. treated timbers.

### Use Only in Emergency

By H. G. Carter
Chief Engineer, Central of Georgia, Savannah, Ga.

In answer to the question as to the advantages of using two 8-in. by 16-in., or two 7-in. by 16-in. timbers placed edgewise, as compared to a 14-in. cap, I would only use this form of laminated cap in case of emergency, as I do not believe you could provide an ade-

quate stringer bearing to have the cap act as a solid timber regardless of how the two-ply, 8-in. pieces are bolted together.

I do believe, however, that we can produce a 5-ply laminated cap, well bolted under pressure, using clamping plates between the laminations. We have had some caps of this laminated type in service for 10 years and they are proving to be highly satisfactory.

# Solving the Right-of-Way Brush Problem

What is the most economical method of cutting brush where its diameter near the ground is from one to two inches? What tools and equipment are needed? How many men should be used to progress the work rapidly?

### Machine Methods Best

By J. R. Scofield
Assistant District Engineer, New York Central, Detroit, Mich.

For the past few years the cutting and/or disposing of brush has become an important item to be considered in our program of work to be accomplished during the fall and winter season. To a certain extent this was brought about on account of the deferment of complete right-of-way mowing during the summer season. Track forces have been kept engaged on the more important maintenance of the track structure, mostly within the limits of the roadbed. Higher labor costs and now the five-day week allow little time to be expended on cleaning of the right of way by old-fashioned methods such as were used when labor was cheap and plentiful and of better quality.

To cut brush we have used three methods: (1) Hand methods, using a combination of brush hooks and axes; (2) electric chain saws; and (3) bulldozers.

The first method does not require much explanation since it is a question of using a gang consisting of a foreman and from six to eight laborers cutting the brush at ground level and placing it in appropriate piles for burning.

We have found the best kind of electric saw to be one that is light, fast, and easy to operate safely. These saws are used in pairs and the motors are operated from a high-cycle generator. One foreman and three men can accomplish about the same amount of work as that done by hand methods using twice the number of men.

In the bulldozer method, an attachment consisting of rugged teeth spaced about 12 in. apart is bolted to the bulldozer blade. This scarifies and pulls the brush from the ground, including most of the roots, all of which is pushed into windrows. After it has dried, it is then piled for burning. This method can be used to advantage where undergrowth is thick and where men are unable to walk. It also leaves the right of way level so that tractor mowers can be used later. One bulldozer operator with one other man can progress this work very nicely and can cover several hundred feet of ground a day, depending on the nature and density of the terrain.

### Hand Tools Still Effective

By William Lindsey
Yard Foreman, Chicago & Illinois Midland, Pekin, Ill.

For small-diameter brush cutting, I choose the grubbing hoe or the equally old-fashioned corn knife. Such tools are certainly more efficient than the axe because of the unorthodox way a person must use to cut brush at times with the latter tool. Furthermore, the small areas in which you sometimes have to work often preclude the swinging of an axe.

So far we have found the grubbing hoe a little more superior to the corn knife in cutting small brush. In turn we find the corn knife has no equal in the cutting of vines, briars, etc., and for cutting close to fences. A briar scythe is also helpful for the removal of small sprouts and weeds or for cutting briars.

It's only natural that those tools come in contact with the ground quite frequently become dull quickly. Part of our equipment, then, consists of a hand-powered tool grinder, which we carry with us and which is easily and quickly attached to our motor car for use when needed.

Another piece of equipment needed is a pitchfork to pile the brush after it has been cut. All brush should be piled and burned as the work goes forward. In this way it is not neglected, or left lying on the ground where, in another year, weeds and brush grow up through it to make the cutting and piling more costly.

With this equipment, four men will be needed to carry out the work swiftly and economically. Three men are required to do the cutting, with the fourth piling and burning. In this way brush cutting can be carried out continuously without having to bring cutters back, sometimes long distances, to pile and burn the brush.

### New Chemical Developed

By L. C. Blanchard
Roadmaster, Chicago, Milwaukee, St. Paul & Pacific, Minneapolis, Minn.

No entirely satisfactory or economical method has so far been developed for cleaning brush, although some progress has been made. Special discers, bulldozers, saws, sickles and other power equipment have been used with varying success. The trouble is, railroad right of ways in most cases impede the movement of power machinery, particularly where the brush grows. Brush is usually most dense along steep high fills or embankments, under telegraph lines, in fence rows, fence corners and around or under bridges. Such hand tools as the axe, brush hook, brush scythe and hand saw with a special handle attached continue to be the most popular and reliable means of cutting this class of brush.

As to the number of men that should be used to progress the work rapidly, I would suggest using a unit of five men—four men

to cut the brush and one man to pile it and clean up. As many of these units could be used as the case warranted.

Hand cutting is, however, fast becoming the "old method" of maintaining right of ways because cost analysis of brush control shows that the use of chemicals is more economical than cutting. There was a time when cheap labor could be employed in the off season to clear right of ways, but this is no longer possible at present wage rates. Depending on the type and density of brush, the cutting cost will vary from $65 per acre to $125 per acre. Under average conditions the cost of chemical and application will fall within this range and in most instances below it. In addition to this, chemical treatment will usually give one to three years longer protection than will hand cutting.

Chemical treatment of brush is not new, as it has been tried over a number of years with various chemicals including ammonium nitrate, potassium nitrate, copper sulfate, sodium chloride, sodium chlorate, sodium arsenite, sodium nitrate, creosote oil and combinations of these chemicals. More recently 2,4-D and 2,4,5-T have won wide acclaim as weed and brush killers. However, they are selective and when combined have shown best results on low-growing bushes rather than taller tree brush. They are both highly volatile and the drift will damage nearby sensitive crops. This last factor must be given consideration when planning their use for brush control.

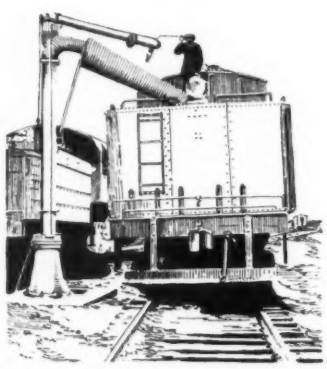
Since the war a new chemical has been proposed for brush control. This compound is known as ammonium sulfamate and is sold under the brand name, "Amate". It was prominently mentioned in a talk on "Evaluation of Brush-Control Chemicals" given by Dr. A. E. Carlson, Cleveland, Ohio, at a conference held recently at Minneapolis, Minn. Dr. Carlson claimed that Ammate is effective against many species of brush not affected by 2,4-D or 2,4,5-T. Most important it is effective against tree growths from a few inches to 20 ft. or more in height, and is not particularly volatile or destructive to adjacent crops. It is neither poisonous to live stock nor a fire hazard. On the other hand Ammate is very corrosive to the equipment using it so that extra precaution must be taken to clean the equipment after use.

He went on to say that, for general brush control, Ammate may be reasonably expected to give about 80 per cent kill (top and roots). The remaining 20 per cent is killed to the ground level, but re-sprouting may occur. Complete kill of sumac, birches, beeches, basswood, many oaks and maples, poplars, poison ivy, sweet gum, black gum, cypress, bay, ironwood, sycamore, chokecherry, poison oak, hardhack, and many others, is not unusual. Re-sprouting can occur from red maple, box elder, elderberry, elm, black locust and ash. Osage orange is an exception to the foregoing in that it is not usually top-killed with Ammate.

On the other hand, according to Dr. Carlson, 2,4,-D and 2,4,5-T are superior to Ammate for the control of box elder, except where tall growth is involved. They also control osage orange, blackberry and raspberry. Elm seems to react faster to 2,4,-D and 2,4,5-T than to Ammate with regard to top-kill but it is not certain that eventual root kill is better. Willows, alder, black locust and elderberry can also be controlled by 2,4-D and 2,4,5-T.

Some trees are resistant to both types of weed killer. Conifers, i.e., pine, spruce, cedar and balsam, are resistant to 2,4-D and 2,4,5-T, but respond to a drenching application of Ammate. Red maple and ash are variable with respect to root kill but Ammate provides top kill that is far superior to that given by hormones. Re-sprouting from Ammate treated plants is suppressed for several years.

Where 2,4-D and 2,4,5-T are used, the general practice seems to be to re-treat the first or second year and at two-year intervals as required. With Ammate this treatment may not be necessary for four to eight years following original treatment. In one case, however, where Ammate had been used in 1948, three different locations were re-treated two years later using 20 per cent to 35 per cent of the original amount of Ammate to kill off the seedlings and surviving growth.



Dr. Carlson also said that, to treat an acre of mixed species of hardwood and brush uniformly four to six feet high, it would cost $38.19 with Ammate and $18.78 with the low volatile esters of 2,4-D or 2,4,5-T. These figures are for the chemicals alone. Thus, it is only in its longer kill and infrequent re-treatments that Ammate's economy becomes evident.

Besides its high first cost, Ammate has one other disadvantage—its high corrosivity to equipment. Corrosion of the metallic parts of conventional spray equipment is serious. It can be reduced by using stainless steel in spray guns and replaceable parts. Exposed metallic parts can also be coated with rubberized "under-coating" such as is often used on automobiles. For still further protection, use covered wires, spark-plug caps, and air-cooled motors on the spray pumps. On the other hand there is no corrosion problem in the use of 2,4-D or 2,4,5-T.

A comparison of the residual effects of the several brush-killing chemicals indicates that neither Ammate nor the hormones leave any apparent soil residue after the first season, for grasses and weeds will grow luxuriantly then. However, Ammate leaves in brush plants a residue that is very apparent during the second and third seasons. This is evidenced by the regrowth of surviving species being suppressed and the plant even dying in the second season. After the use of 2,4-D or 2,4,5-T, effective residues in plants disappear after the first season with regrowth becoming normal in vigor.

Probably the greatest advantage of Ammate is its characteristic of being non-poisonous and non-volatile—being harmful neither to animals, crops nor ornamentals. However, like 2,4-D and 2,4,5-T, Ammate may develop poisonous alkaloids in some plants, such as wild cherry.

It is in their adverse effect on some crops such as beans, tomatoes, cucumbers, melons, cotton and ornamentals that 2,4-D and 2,4,5-T solutions have their greatest disadvantage. The volatile esters of these chemicals are especially

hazardous. The so-called low-volatile esters are considerably improved over the conventional esters, but are still too volatile. For general use the amine formulations are far superior in this respect.

### Uses Bulldozers

By George S. Crites
Division Engineer (Retired), Baltimore & Ohio, Baltimore, Md.

Where the terrain permits, a small bulldozer run by an expert can uproot, mash down and mix heavy brush with the soil at little cost. This procedure improves the ground and retards erosion.

If heavy brush is plentiful and a bulldozer cannot be used to get rid of it, a light power saw will quickly slash it down. This takes two men to operate the saw and two men to clear away and pile the cut brush. To keep the stumps from starting a vigorous new growth, suitable poison should be put on top of the stumps or else a copper nail should be driven into their sides.

When the brush growth is not heavy and the soil permits, one or two men can pull it over to one side while another man with a cutting mattock readily uproots brush up to two inches in diameter. These men then pile the brush for burning.

## Colors Through Glare-Reducing Glass

What effect, if any, does the use of non-glare or heat-resisting glass in the windows of interlocking towers have on an operator's ability to differentiate between the various colors of signal lights? Why?

### Has No Adverse Effect

By O. F. Wenzler
Manager Sales Technical Service, Libbey-Owens-Ford Glass Company, Toledo, Ohio

The greenish tint of non-glare, heat-resisting glass does not have any perceptible effect on the accuracy of distinguishing the colors of railroad signal lights as we know them. As far as we know, railroads who use these glasses have found this to be true. In other words, an operator should be able to distinguish readily between the various colors of signal lights where such glasses are used in windows.

### Color Is Not a Factor

By Engineer Of Buildings

We put special glare-reducing and heat-absorbing glass in the windows of pent-house yard offices to reduce the eye strain on the operators. Although this glass is pale green, the transmission of light through it is diminished only slightly. In fact, visibility is so good, I have never noticed whether colors appear different through glare-reducing glass or not. I do know, however, from experience, that I have often been so blinded by headlights at night or when looking into the sun through clear glass that, for a period of time, I couldn't see anything or tell red from green or any other color.

Why should the distinguishing of colors be very important to an operator looking through his windows? What signal lights can he see? The home signals on each side of his interlocking face away from him and are thus out of his sight. He may see a few dwarf signals, but I cannot recall any case in which he can see all of them. On this basis, I can see little need for an operator to distinguish colored lights through his windows, but I can see a great need to reduce the glare and resulting eyestrain. If whole divisions of heavy-traffic railroads can be operated from a centralized-traffic-control office many miles from controlling signals, I can see no need to limiting window glass in any tower to clear panes.

The same reasoning applies to the use of heat-resisting and/or glare-reducing glass in the high towers now being constructed in modern car-retarder yards. There is more need for continuous clear views of cars and yard operations than for the periodic distinguishing of colors. In any case, I do not believe that glare-reducing glass has enough effect on the differentiation of colors through it to warrant consideration.

***IN THIS TIMBER PANEL GRADE CROSSING** prefabricated by Koppers Company, Inc., for the Mathieson Chemical Corporation, Saltville, Va., are 15,000 board feet of pressure-creosoted lumber. Measuring 100 ft. long and consisting of 105 panels and 42 flangeway fillers, the crossing is one of the first of its type to be installed by an industrial plant. The tracks are part of a branch line of the Norfolk & Western.*

# PRODUCTS OF MANUFACTURERS

## New, improved equipment, materials, devices

*(For additionad information on any of the products described in these columns, use postcards, page 343.)*

### TRACTOR LOADER

THE Tractomotive Corporation, Deerfield, Ill., has announced the TL-10 Tracto-Loader—a wheel-mounted materials-handling unit

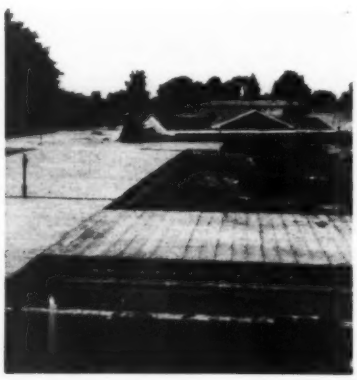
featuring a hydraulic torque-converter drive and a clutch-type transmission of a new design. According to the manufacturer the torque converter furnishes a smooth, constant flow of power to the drive wheels, eliminates practically all spinning of wheels while loading, improves the crowding action, permits loading in a higher gear, provides easier operation and reduces wear and tear on clutches and other parts.

The new clutch-type transmission is designed to eliminate most gear shifting. Two multiple-disc clutches are built into the transmission, one for forward motion and the other for reverse. Only one clutch is engaged at one time. The operator moves the machine forward or backward simply by pushing or pulling one lever. A selection of four speed ranges in either direction is provided.

The TL-10 is mounted on rubber tires, has a ¾-yd. hydraulically-controlled bucket and weighs 10,650 lbs. Power is furnished by an Allis-Chalmers 40.5 hp. gasoline engine.

### PRECAST CONCRETE HOLLOW BEAMS

THE Permacrete Products Corporation, Columbus, Ohio, has announced new precast-concrete, steel-reinforced hollow beams for simplifying building floor and roof construction. Known as Corflor, these units can span up to 32 ft.

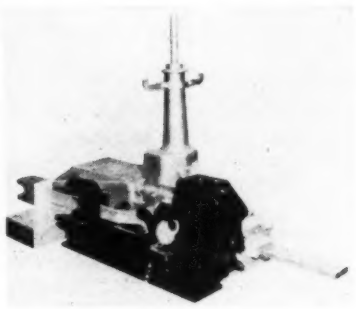


for a 35-lb. roof load without supporting beams, and can be placed at the rate of 4,000 to 6,000 sq. ft. a day. Used in floor construction, they can span up to 20 ft. for a 150-lb. load, up to 18 ft. for a 250-lb. load, and 16 ft. for a 265-lb. load. With a 12-ft. span the units will carry 510 lb. per sq. ft. These loadings are in addition to the weight of the units, which is 53 lb. per sq. ft.

In section, the units are 8 in. square and are obtainable in even-foot lengths from 12 to 32 ft. In placing these beams, they are laid side by side, touching at the lower quarters. The upper three-fourths of the unit is ¼ in. narrower than the base, and the sides have two grooves so that mortar can be introduced and keyed for cementing the units together. The center hole is 6¼ in. in diameter, formed by spinning, and permits the units to be used as ducts for panel heating.

### TANDEM SWITCH LOCK

THE General Railway Signal Company, Rochester, N. Y., has developed an electric switch lock, known as the Model 10, with a tandem arrangement for locking the hand-throw lever of a switch stand or hand-operated switch machine in either the normal or reverse position. With the tandem arrangement the lock is coupled with a separate latch stand. A square tube connects the treadle shaft for the lock-latch stand with the treadle shaft for the reverse-position latch stand. Only one lock



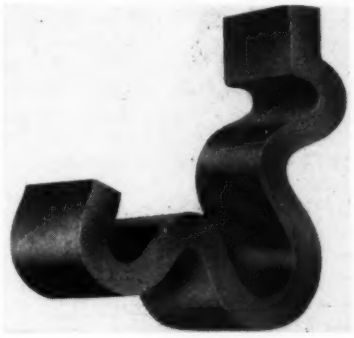
mechanism is required. Sub-bases and a mounting plate, attached to the lock and the stand by plow bolts, are said to make the entire tandem lock a rigid unit capable of withstanding hard usage and vibration.

The Model 10 tandem lock can be applied to most ground-throw switches in common use. It will

accommodate hand-throw levers from ¾ in. by 2 in. to 1 in. by 2 in., and may be used on either right-hand or lefthand layouts.

## IMPROVED RAIL ANCHOR

THE Woodings Forge & Tool Co., Verona, Pa., has announced that the Woodings rail anchor has been improved both in design and metal-



lurgical makeup. The design change consists of a heavier section for the part of the anchor that fits on the rail base. The metallurgical improvements are the result of new manufacturing and treating procedures.

## NEW COMBINATION OF WEED-KILLING CHEMICALS

THE R. H. Bogle Company, Alexanderia, Va., is offering a new combination of weed-killing chemicals which, in research field tests carried out last year in four southeastern states, is reported to have killed 90 to 95 per cent of such plants as Bermuda grass, nut-grass, broom sage and honeysuckle. The combination consists of sodium arsenite and sodium trichloroacetate.

## PRECISION POWER SAW

THE Wright Power Saw & Tool Corp., Stratford, Conn., has announced the Wright Precision power saw—a cutting unit which is said to be as accurate and easy to handle as a handsaw, but up to 20 times as fast. Weighing 14 lb., the saw is air operated by any compressor with a capacity of 60 c.f.m. or more.

The Wright saw drives twin reciprocating 21-in. blades through a 4-in. stroke at a rate of 1,500 strokes a minute. According to the manufacturer, the opposed motion of the blades provides dynamic balance to the extent that thrust

or torque during sawing, or "kick" on completion of a cut, is eliminated. The saw is reported to be equally effective for crosscutting, ripping or notching. Sawdust is blown away from the operator and cannot clog or bind the blades. The width of cut is limited only by the length of the blades; the depth of cut is unlimited. The saw teeth can be resharpened and set the same as any handsaw.

## IMPROVEMENTS IN MOTOR SCRAPER

THE LaPlant Choate Manufacturing Company, Inc., Cedar Rapids, Iowa, has made a number of changes in its TS 300 motor scraper. This is a large earth-moving machine consisting of a high-speed two-wheel rubber-tired tractor flexibly joined by a pedestal hitch assembly to a two-wheel rubber-tired scraper to form a single integral four-wheel self-propelled unit. The power plant was changed from a 225-hp. Buda Diesel engine to a 280-hp. Buda Diesel; the radiator and fan were increased in size; the differential was improved; the final drive axle was re-designed; and the side doors were improved.

## PROTECTIVE COATING

A MASTIC compound, known as Protek-coat, which is manufactured by the Nox-Rust Chemical Corporation, Chicago, is being introduced into the railroad field by Champion Transportation Sales, Chicago. This product has an asphalt base and is said to form a non-corrosive, flexible, waterproof, acid-and-alkali-resistant coating adaptable to a wide range of temperatures. It is claimed to prolong the service life of ties at a fraction of their replacement cost and to protect steel surfaces from the corrosive effect of brine drippings.

It can be applied by either brushing or spraying, and is said to bond securely to metal, concrete, wood, paper, painted surfaces, or any surface free from oil, grease, wax, loose rust or dirt. It can also be applied to freshly creosoted surfaces. No prime coat is required and one coat of the compound is said to be sufficient to form a flexible, weatherproof surface that dries to a firm, pliable

and nonporous coating 10 to 20 times thicker than a coat of ordinary paint. It forms a fire-retardant surface because it does not sustain flame beyond the point of ignition.

## STEAM EQUIPMENT FOR SPRAYING PAINT

A COMPLETE line of paint-spraying equipment, including a spray gun, which utilizes super-heated steam instead of compressed air as the atomizing agent, has been introduced by the Kellogg Division of the American Brake Shoe Company, New York. With this system of spraying it is claimed that paints of higher viscosity can be used because the material is heated

by the steam. Hence, it is said, heavier coats can be applied without sagging or running. Furthermore, a reduction in pinholing and popping caused by entrapped air is reported.

For steam spraying a source of steam with a pressure of not less than 100 p.s.i. is required as well as separators, strainers, traps, regulators and a superheater to dry the steam. The steam spray gun developed by Kellogg known as the S-100, incorporates insulation and radiation features which so dissipate the heat of the steam in the gun that the operator can hold it continuously with his bare hands. Supports are provided for the steam and paint hoses which are designed to reduce the downward torque on the spray head, making the gun easy to handle. Other features of the gun include a built-in finger guard, an adjustable fluid needle, and a spray head with a one-piece, easy-to-clean steam cap.

# What Our Readers Think

## MORE ON THE M/W RATIO

Chicago

To THE EDITOR:

THE EDITORIAL in the January, 1951, issue of *Railway Engineering and Maintenance*, under the heading "The M/W Ratio—Does It Have To Be So High?," presents an interesting viewpoint, but it leaves unexplained the fallacy of using this ratio in a statistical analysis to compare one period with another.

The editorial calls attention to "the relatively high proportion of total railway revenues now being spent for maintenance of tracks and structures". It is contended that the ratio is far out of line from what was considered normal in pre-war years; also that for the ten years ending with 1944 the average ratio was 11.7.

Based on the experience of Class I carriers for the last 25 years, those who are responsible for maintenance-of-way expenditures should not be misled by the simple indication resulting from dividing maintenance-of-way expenditures by revenues (the M/W ratio). A statistical analysis embracing the last 25 years shows that, based on a computed normal for this quarter of a century, the maintenance-of-way expenditures in recent years are not much out of line.

Maintenance-of-way and structures expenditures since January 1, 1943, may appear to have greatly increased, but one must not forget that accounting policies laid down by the Interstate Commerce Commission required the institution of depreciation accounting on January 1, 1943, which added substantially to bookkeeping maintenance expenses; also, prior to that date, certain expenditures were charged to profit and loss in connection with retirements, which further makes comparability with the present-day statistics inaccurate unless some reconciliation is effected.

It should not be overlooked that the cause of higher or lower maintenance cost stems from the past as there may be a lag of some years between cause and effect. Neglect or failure to obtain funds some years ago for maintenance work has its effect on the M/W ratio of today; conversely, wise policies in the past react today in a lower ratio. Fortunate is the maintenance officer who in prior years obtained capital expenditures and/or maintenance appropriations consistent with the traffic outlook to improve track and structures so as to reduce subsequent annual out-of-pocket maintenance expense.

The M/W ratio should not be considered as a barometer of maintenance efficiency. Revenues rise and fall for reasons different than maintenance requirements. At the best, the ratio merely indicates the proportion of revenues flowing into the cost of maintaining the fixed property.

The use of the M/W ratio to budget expenditures rigidly is unscientific. Also this ratio has a limited relationship to the needs of a property. There is a need for other yardsticks and/or formulas for determining maintenance needs. This subject is not a new one and the fundamentals were ably expressed in a report of an A.A.R. committee on "Analysis of Statistical Information Relating to Operating Costs Useful for Managerial Purposes" (A.R.E.A. proceedings, Vol. 47, page 273). On page 279 the committee says:

"It follows that since the requirement for maintenance has no fixed relation to revenues it should not be related to revenue statistics. Natural deterioration causes a large part of maintenance expense, so, although maintenance expenses may vary with the revenues, the wear and tear occasioned by transporting the increased business is not the sole cause of an increase in those expenses. That a large proportion of maintenance expense is not attributable to use is shown by the fact that the so-called Yager formula assigns only one-third of maintenance of way and structures expenses to use."

Your editorial is timely to alert maintenance officers as to the need of examining their maintenance requirements, but this should be based on the principle of efficient management and then give some consideration to the M/W ratio.

C. C. HAIRE
Member Committee 11—
Records & Accounts, A.R.E.A.
Valuation Engineer,
Illinois Central, Chicago

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# THE MONTH'S NEWS

## Happenings among the railways — the associations — the suppliers

## Changes in Railway Personnel

### General

**Ray J. Burgess,** track supervisor on the Southern at Laurel, Miss., has been appointed trainmaster at Hattiesburg, Miss.

**James G. Beard,** trainmaster on the Southern at Danville, Ky., and an engineer by training and experience, has been promoted to superintendent at Selma, Ala.

**S. M. Percival,** chief engineer and superintendent of the Atlantic & Danville, at Lawrenceville, Va., has been appointed superintendent of the Danville & Western, with headquarters at Danville, Va.

**Walter A. Jackson,** assistant trainmaster on the New York Central at Springfield, Ohio, and formerly assistant supervisor of track at Buffalo, N. Y., has been appointed trainmaster at Buffalo.

**H. G. Dennis,** district maintenance engineer on the Chicago, Rock Island & Pacific, with headquarters at Kansas City, Mo., has been appointed acting superintendent of the Cedar Rapids division, with headquarters at Cedar Rapids, Iowa.

**Wayne Smith,** supervisor of track on the Illinois Central, with headquarters at Mattoon, Ill., has been recalled, with the rank of lieutenant colonel, to active duty as deputy director, Eastern Region, Department of Army, Operation of Railroads, with headquarters at New York.

**James J. Frawley,** assistant vice-president of operations and maintenance of the New York Central, has been promoted to vice-president, operations and maintenance, with headquarters as before at New York, succeeding **Frank J. Jerome,** whose appointment as executive vice-president was announced in the March issue. **Richard G. May,** manager of freight transportation at New York, and an engineer by training and experience, has been advanced to assistant to vice-president, operations and maintenance, at New York.

**Roy Putnam Hart,** chief engineer of the Missouri Pacific Lines, has been appointed chief operating officer, with system jurisdiction and with headquarters as before at St. Louis, Mo.

### Engineering

**William B. Hobbs,** director of research of the Missouri Pacific Lines, has been promoted to chief engineer, with system jurisdiction and with headquarters at St. Louis, Mo. He succeeds **Roy Putnam Hart,** who has become chief operating officer, as announced elsewhere in these columns. **W. H. Giles,** engineer of design has been promoted to assistant chief engineer construction, with headquarters as before at St. Louis. He succeeds **Page P. Wagner,** who has been appointed director of research, as announced elsewhere in these pages, and is in turn succeeded by **R. H. Carpenter,** division engineer at Poplar Bluff, Mo.

A 1912 civil engineering graduate of the Oklahoma Agricultural and Mechanical College, Mr. Hobbs began service with the M. P. shortly after completing college. He started as a rodman on an engineering party at Little Rock, Ark., and later served as instrumentman and assistant engineer on various divisions until early in 1918, when he entered the Army as a second lieutenant in the field artillery. Upon his return from military service he was made assistant engineer on the M. P. at Monroe, La., which post he later held at Kansas City until 1920, when he was transferred to the chief engineer's office at St. Louis. Appointed engineer of design in charge of design and construction of yard facilities in 1925, Mr. Hobbs became engineering assistant in the executive department in 1937, and when the bureau of research was established early in 1943, he was appointed its director.

William H. Hobbs

**Troy A. Barnett,** supervisor of track on the Southern at Hickory, N. C., has been promoted to assistant division engineer, with headquarters at Atlanta, Ga.

**R. A. Morrison,** engineer maintenance of way of the Pere Marquette district of the Chesapeake & Ohio, with headquarters at Detroit, Mich., has resigned. The position of engineer maintenance of way of this district has been abolished.

**H. E. Wilson,** who has been on a leave of absence, has returned to his position as district engineer, Eastern district, Eastern lines, of the Atchison, Topeka & Santa Fe, with headquarters at Topeka, Kan.

**J. C. Hill,** general superintendent maintenance of way of the Green Bay & Western and the Kewaunee, Green Bay & Western, with headquarters at Green Bay, Wisc., has been appointed engineer maintenance of way.

**T. F. Burris,** division engineer of the Chesapeake & Ohio at Grand Rapids, Mich., has been promoted to assistant chief engineer at Detroit, Mich. He is succeeded by **H. W. Kellogg,** division engineer at Saginaw, Mich., who is in turn replaced by **C. I. Hartsell,** division engineer at Detroit. Succeeding Mr. Hartsell is **Frank Manning,** resident engineer at Detroit.

**C. S. Colvin,** division engineer terminals of the International-Great Northern, has been appointed acting assistant engineer structures of the Missouri Pacific Lines, with headquarters as before at Houston, Tex. He succeeds **R. E. Caudle,** who has been granted a furlough on account of ill health.

**E. F. Snyder,** division engineer on the Illinois Central, with headquarters at Champaign, Ill., has been promoted to assistant to chief engineer, with headquarters at Chicago, succeeding **L. L. Lyford,** who has retired. **P. A. Cosgrove,** supervisor of track at East St. Louis, Ill., has been promoted to division engineer at Champaign to succeed Mr. Snyder.

**Robert L. Etherton,** trainmaster and former roadmaster on the Chicago, Rock Island & Pacific, has been appointed

*(Continued on page 382)*

READE EST. 1883

# RESPONSIBILITY

## A BIG CONSIDERATION

## IN A *Brush Control* PROGRAM

### THE NEW THING IN MAINTENANCE OF RIGHT OF WAY IS BRUSH CONTROL

The interest in such work is nothing less than astonishing. The reason is obvious. Test work and limited contract work let out in 1950, proved beyond a doubt that brush control by the use of chemical shows tremendous dollar savings with benefits that should extend for a period of years beyond the year in which treatment is made. Mowing costs have become prohibitive.

Our own experience and the figures compiled in contract work, will interest you. They are yours for the asking.

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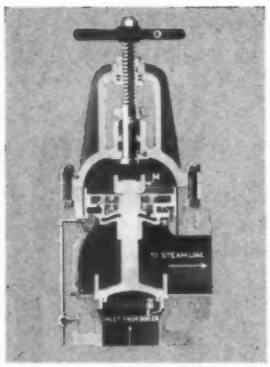
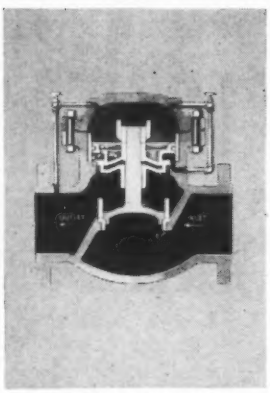




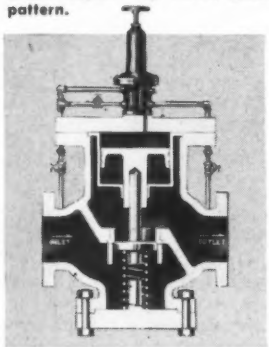
*Reading from top to bottom:*

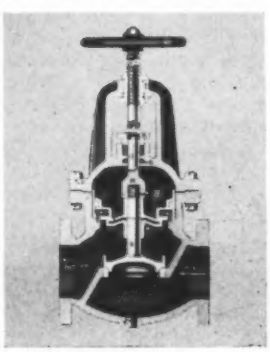
G-A double-cushioned single-acting non-return valve, angle pattern.

G-A double-cushioned check valve, globe pattern.

G-A cushioned unloading valve, globe pattern.

G-A combined throttle and automatic engine stop valve, globe pattern.





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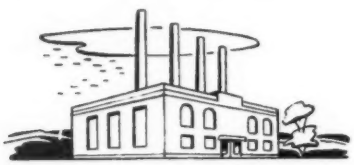

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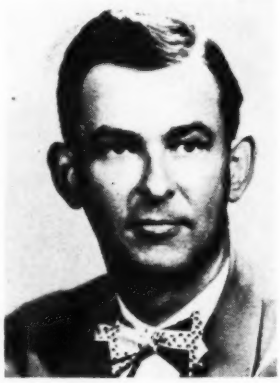
## Railway Personnel (Cont'd)

acting district maintenance engineer, with headquarters at Kansas City Mo., succeeding **H. G. Dennis,** who has been appointed acting superintendent at Cedar Rapids, Iowa, as announced elsewhere in these pages. **M. E. Lau,** roadmaster at Atlantic, Iowa, has been appointed acting district maintenance engineer, with headquarters at Des Moines, Iowa, succeeding **J. W. Shurtleff,** who has been granted a leave of absence.

**George A. McRoberts,** assistant division engineer on the Southern, has been promoted to division engineer, with headquarters as before at Birmingham, Ala., succeeding **Harry A. Metcalfe,** who has retired.

**George L. Sitton, Jr.,** whose promotion to division engineer on the Southern at Selma, Ala., was reported in the January issue, was born at Richmond, Va., on September 27, 1915, and graduated from the University of Tennessee with the degree of Bachelor of Science in civil engineering on June 6, 1938. He entered the service of the Southern as a section laborer at Knoxville, Tenn. On November 1, 1938, he was advanced to student apprentice at Hickory, N. C., and later transferred to Dalton, Ga. He was appointed assistant supervisor of track at Knoxville on May 1, 1941, advancing to supervisor at Sheffield, Ala., on June 1, 1942. On May 23, 1944, Mr. Sitton was appointed roadmaster on the Kentucky & Indiana Terminal at Louis-



**George L. Sitton, Jr.**

ville, Ky., and on October 9, 1946, was promoted to valuation engineer, with the same headquarters. He returned to the Southern on December 15, 1946, as assistant division engineer at Louisville, and was transferred to Birmingham, Ala., on August 26, 1949, retaining the latter position until his promotion to division engineer on November 1, 1950.

**K. A. Truman,** whose promotion to special engineer on the Canadian Pacific at Winnipeg, Man., was announced in the January issue, was born on June 8, 1911, at Craik, Sask., and graduated



*For additional information, use postcard, pages 343-344*

in civil engineering from the University of Manitoba in 1935. His career with the Canadian Pacific began in the summer of 1929, when he served as chainman on construction work at Coronation, Alta., and in subsequent vacation seasons he served as laborer at various locations. Following his graduation, he became a rodman on the Kenora division

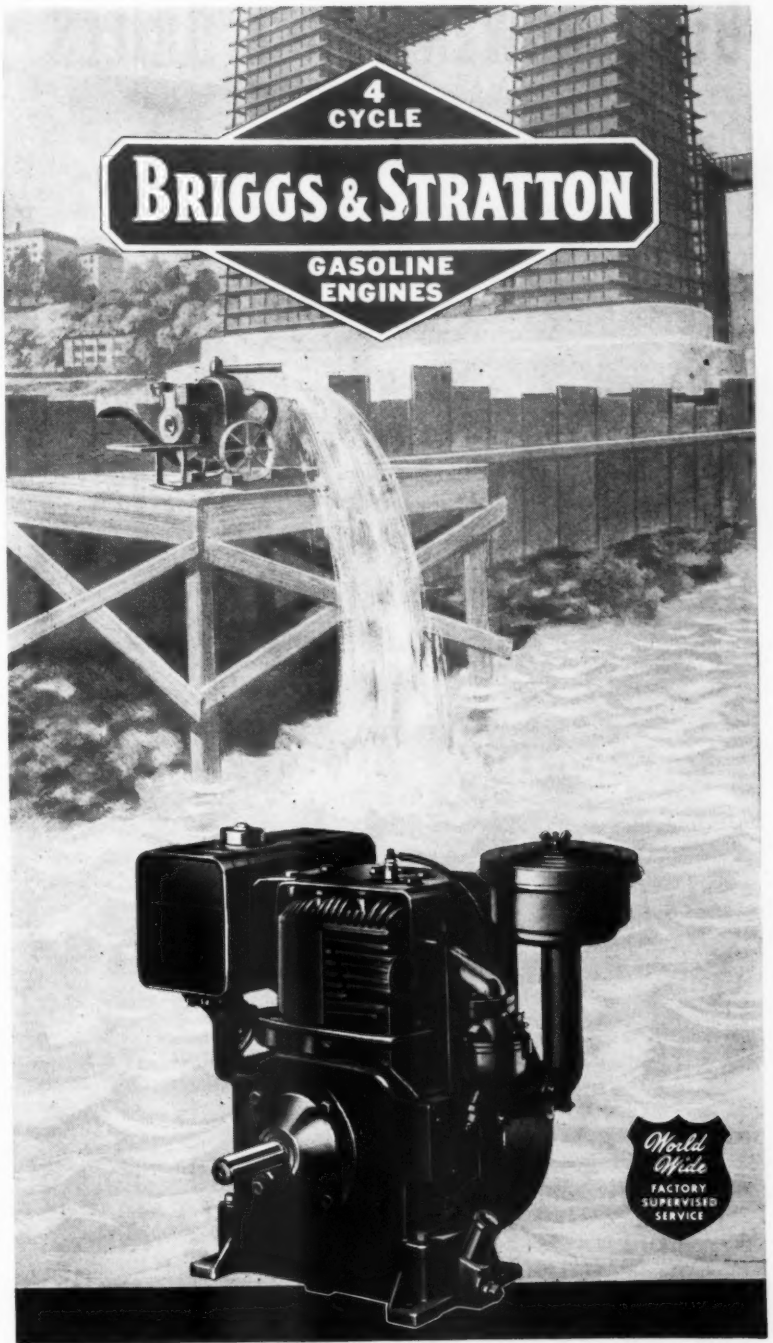
K. A. Truman

and later served in this and other capacities until he was promoted to roadmaster at Manyberries, Alta. In 1944 Mr. Truman became division engineer at Medicine Hat, Alta., and in early 1950, assistant district engineer of the British Columbia district at Vancouver, B. C. He retained the latter position until his recent appointment.

**Rush A. Kelso,** whose promotion to division engineer on the Southern, with headquarters at Atlanta, Ga., was reported in the February issue, was born at Brownsville, Tenn., on November 12, 1913. He graduated in civil engineering from the University of Tennessee in 1937. His service with the Southern began on August 1, 1942, when he became student apprentice at Corinth, Miss. He was promoted to assistant track supervisor exactly a year later, serving at Cochran, Ga., and at Sheffield, Ala. On September 1, 1948, Mr. Kelso was appointed bridge and building supervisor at Valdosta, Ga., remaining there until November 1, 1949, when he was transferred in the same capacity to the Atlanta division. On January 1, 1950, he was advanced to assistant division engineer at Atlanta, which position he held at the time of his recent promotion.

**Clarence E. Jackman,** whose promotion to division engineer of the Newark division of the Baltimore & Ohio at Newark, Ohio, was reported in the January issue, was born at Byers, Ohio, on November 27, 1917, and graduated from Purdue University with the degree of B. S. in civil engineering in June, 1940. He entered the service of the B. & O. on June 16, 1940, as a blueprinter at

*(Continued on page 384)*

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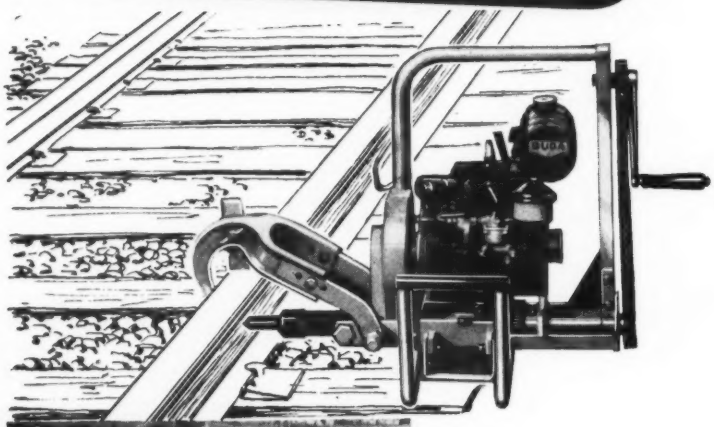

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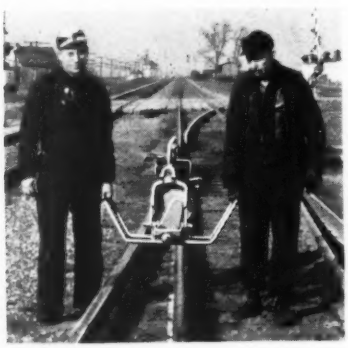

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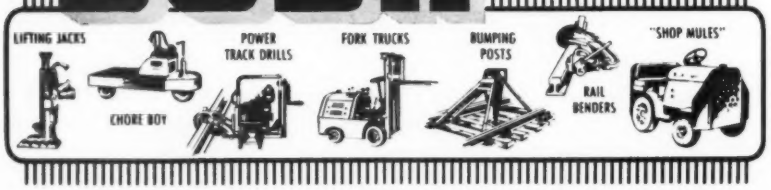
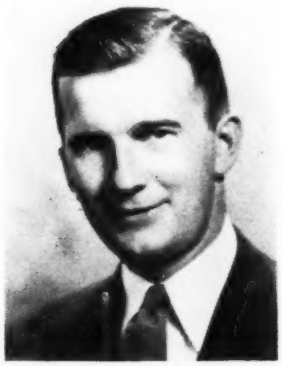




## Railway Personnel (Cont'd)

Cincinnati, Ohio. In October of that year he was advanced to assistant on the engineering corps., and in November, 1945, to assistant engineer, at Cincinnati. Mr. Jackman was appointed assistant division engineer on the Newark division in September, 1947, transferring to the



Clarence E. Jackman

Pittsburgh division, with headquarters at Connellsville, Pa., in October, 1948, and served in that capacity until his promotion to division engineer in October, 1950.

**A. V. Johnston,** whose appointment as assistant chief engineer system of the Canadian National, was born at St. Thomas, Ont., on July 31, 1909, and graduated from Queens University with a Bachelor of Science degree in electrical engineering in 1935. He joined the C. N. R. in 1927, serving in various positions in the bridge and building department until August, 1936 when he

A. V. Johnston

became bridge and building master on the St. Thomas and Stratford divisions. In 1941 he was appointed assistant division engineer of the Belleville division. Mr. Johnston was promoted to division engineer at Hornepayne, Ont., in 1942, transferring to the Belleville division in 1945, in which capacity he served until 1946 when he became senior assistant engineer of the Central region


*For additional information, use postcard, pages 343-344*

at Toronto. The following year he was appointed office engineer at Toronto, advancing to assistant chief engineer in 1949. He retained the latter position until May, 1950.

**E. A. Bleakley,** whose promotion to chief engineer of the Savannah & Atlanta was reported in the March issue, is a graduate of the Georgia School of Technology. Shortly after graduation, he became connected with the S. & A., working on location survey of the extension of the railway from St. Clair Ga., to Camak, Ga., and later as resident engineer during the construction of this line. Upon completion of this work, he became associated in an engineering capacity with the firm of Westinghouse-Church-Kerr, following which he served two years in the U. S. Army in World War I, 18 months of which was overseas duty as 1st Lieutenant in the 30th Infantry Regiment of the Third Division. Mr. Bleakley returned to the service of the S. & A. in 1927 as assistant engineer, and since that time has been continuously in its employ. On November 1, 1950,

E. A. Bleakley

he was appointed assistant chief engineer, which position was abolished with Mr. Bleakley's appointment to his new position.

## Track

**I. H. Weaver,** assistant supervisor of track on the Chesapeake & Ohio, has been promoted to supervisor of track, with headquarters as before at Chillicothe, Ohio. He succeeds **J. Broshears,** who has retired. In turn Mr. Weaver is succeeded by **L. E. Williams.**

**W. S. Clement,** assistant roadmaster on the Radford division of the Norfolk & Western, with headquarters at Williamson, W. Va., has been appointed acting roadmaster at Pulaski, Va., succeeding **B. H. Lester,** who has been recalled to military service.

**R. C. Hackney,** track supervisor on the Chicago, Burlington & Quincy, has been promoted to roadmaster, with headquarters at Central City, Neb., succeeding

*(Continued on page 386)*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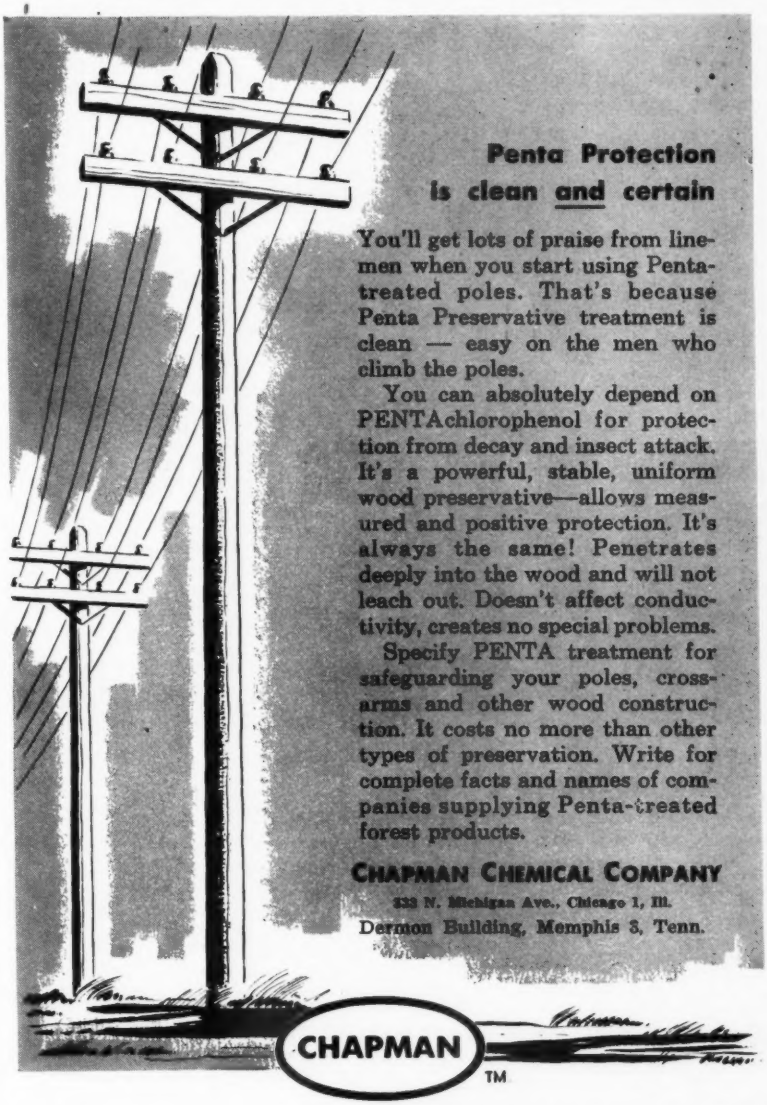

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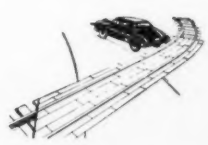

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## Railway Personnel (Cont'd)

**G. L. Thompson,** who has been transferred to Gillette, Wyo. Mr. Thompson replaces **H. E. George,** who has been assigned to other duties.

**Paul Anderson,** section foreman on the Iowa division of the Illinois Central, has been promoted to supervisor of track at Cherokee, Iowa, succeeding **A. B. Hillman, Jr.,** who has been transferred to Council Bluffs, Iowa. Mr. Hillman succeeds **C. J. Harrington,** who has been transferred to East St. Louis, Ill., where he replaces **P. A. Cosgrove,** whose promotion to division engineer at Champaign, Ill., is noted elsewhere in these columns. **H. F. Longhelp** has been appointed supervisor of track at Carbondale, Ill., succeeding **L. E. Brault,** who has been transferred to Baton Rouge, La., to replace the late **K. S. Sale.**

**F. N. Collins,** extra gang foreman on the Chicago, Rock Island & Pacific, has been promoted to roadmaster, with headquarters at Eldon, Mo., succeeding **R. E. Smith,** who has been transferred. **G. B. Winters,** who has been on a leave of absence because of illness, has returned to his position as roadmaster at Little Rock, Ark., and **C. J. Overholser,** who has been on a leave of absence because of an injury, has returned to his position as roadmaster at El Reno, Okla. **Harry E. Strate,** assistant engineer at Fort Worth, Tex., has been appointed assistant roadmaster there, and **J. A. Bubenyak** has been appointed assistant roadmaster at Trenton, Mo.

**Donald H. MacLeod,** assistant track supervisor on the Southern at Hickory, N. C., has been promoted to track supervisor, with headquarters at Cochran, Ga., succeeding **John H. Hall,** who has been transferred to Hickory to replace **Troy A. Barnett,** whose promotion to assistant division engineer is noted elsewhere in these columns. **Herbert D. Minnis, Jr.,** assistant track supervisor at Charlotte, N. C., has been advanced to track supervisor at Orangeburg, S. C., and **Gerald S. Williams,** track supervisor at Greenwood, S. C., has been transferred to Laurel, Miss., to succeed **Ray J. Burgess,** whose appointment as trainmaster is noted elsewhere in these columns.

**W. E. McCoppin,** assistant supervisor of track on the Susquehanna division of the Pennsylvania at Williamsport, Pa., has been transferred to the Panhandle division, with headquarters at Steubenville, Ohio.

**T. T. Word** has been appointed roadmaster on the Panhandle division of the Atcheson, Topeka & Santa Fe, with headquarters at Wellington, Kan., succeeding **F. E. Dauner,** who has been assigned to other duties. **C. C. Chamberlin** has been appointed track supervisor on the Panhandle division, with headquarters at Alva, Okla., succeeding **B. C. Houser.**

**F. A. Williams,** whose promotion to supervisor of track on the New York Central at Brewster. N. Y., was reported in the February issue, was born at Jersey Shore, Pa., on June 22, 1911, and graduated from Pennsylvania State College with the degree of Bachelor of Science in electrical engineering in 1934. He began service with the New York Central on April 17, 1936, as a chainman at Jersey Shore, advancing to rodman in 1938, and to transitman in 1914. On June 21, 1943, he was appointed assistant supervisor of track, with headquarters at Batavia, N. Y., serving in that capacity until his recent promotion.

## Bridge and Building

**Carl G. Carbaugh,** inspector in the engineering department of the Shenandoah division of the Norfolk & Western, has been appointed acting supervisor of bridges and buildings, succeeding **G. W. Gearhart,** who has been recalled to military service.

## Special

**Page P. Wagner,** assistant chief engineer-construction of the Missouri Pacific Lines, has been appointed director of research with headquarters as before at St. Louis, Mo. He succeeds **W. H. Hobbs,** whose promotion to chief engineer system is announced elsewhere in these pages.

## Obituary

**Drewry L. Smith,** retired roadmaster on the Shenandoah division of the Norfolk & Western, died recently.

**Gilbert A. Owens,** retired roadmaster on the Canadian Pacific died recently at Cartier, Ont., at the age of 74.

**K. S. Sale,** supervisor of track on the Illinois Central, with headquarters at Baton Rouge, La., died recently.

**Albert Cook,** retired resident engineer on the Erie, died recently at Fort Myers, Fla., at the age of 69.

**A. E. Botts,** retired assistant chief engineer of the Chesapeake & Ohio, died recently at Clifton Forge, Va.

**Wilbur O. Nelson,** assistant maintenance engineer on the staff of chief engineer maintenance of the Baltimore & Ohio, died recently at Baltimore, Md., at the age of 63.

**A. R. Holtby,** retired bridge and building master on the Canadian National died recently at Prince Rupert, B. C., at the age of 91, and **G. G. McCue,** retired bridge and building master, died at Ottawa East, Ont., at the age of 79.

**John Reed,** retired civil engineer, who was senior engineer in the Eastern district of the Bureau of Valuation of the Interstate Commerce Commission at Washington, D. C., from 1914 to 1922, died on January 15 at his home in Benton Falls, Waterville, Me.

*(Please turn to page 388)*


NORTHWESTERN

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TYPE 49

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# Association News

## Metropolitan Maintenance of Way Club

The annual meeting of the club will be held on Thursday, April 26, at the Hotel Shelburne, New York. This meeting will be featured by an open forum discussion on a number of subjects pertaining to current maintenance problems such as: (1) What changes have occurred as a result of the 40-hour week? (2) Do you have a shortage of manpower? How can this be overcome? (3) What qualifications should a good supervisor have? C. K. Scott, engineer maintenance of way, Erie, Jersey City, N. J., will act as moderator. Following the regular program the annual election of officers will be held.

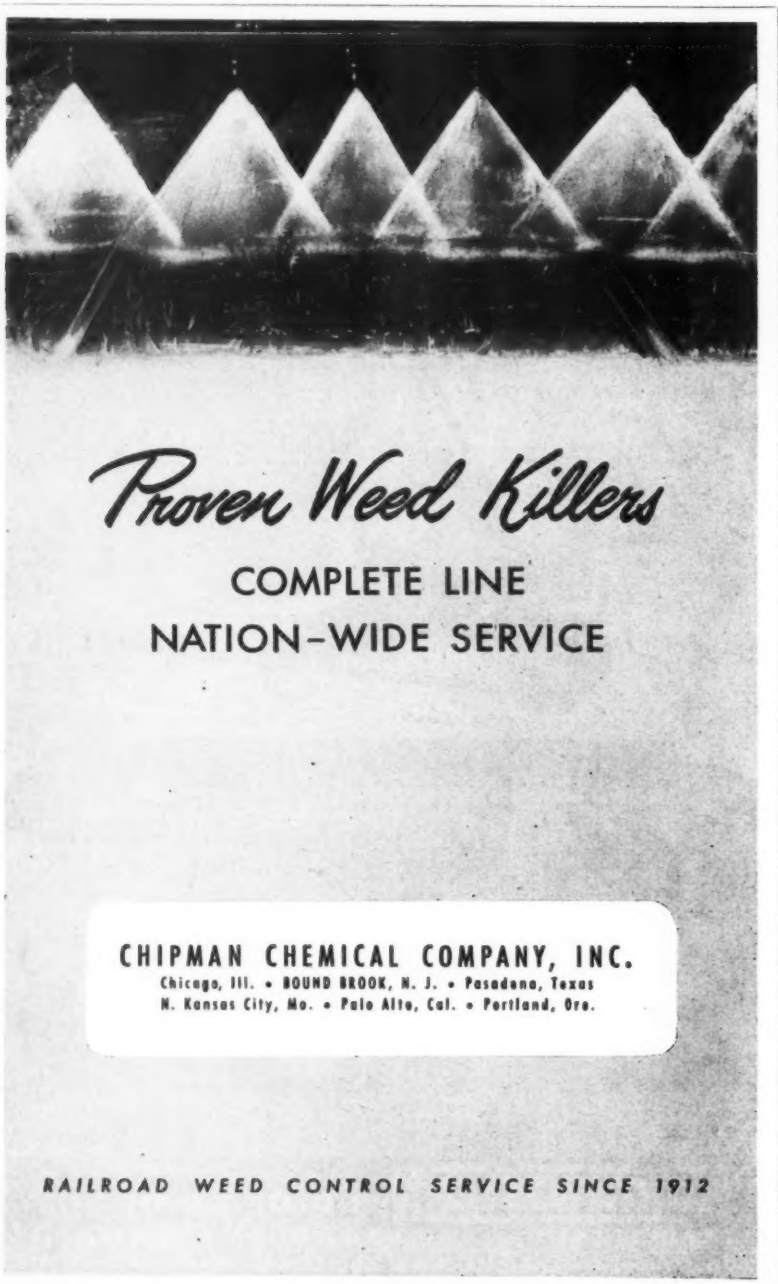
## Roadmasters' Association

Under the direction of President Cornell Halverson the Executive committee of the association held a meeting on Monday, March 12, at the Chicago Engineers' Club. Much routine business was discussed, including the drive being made to obtain new members, the status of the Proceedings of the 1950 convention, and the progress made in organizing the technical committees that are to prepare reports for presentation at the 1951 convention. It was decided to hold the next meeting of the Executive committee on July 9.

## American Railway Engineering Association

The fiftieth annual meeting of the association was held at the Palmer House, Chicago, March 13-15. A highlight story of this meeting, including a list of the newly-elected officers and candid photographs of many of the members and guests who attended the meeting, is presented in this issue on pages 353 to 356.

By action of the Board of Direction at a meeting immediately following the close of the convention, the 1952 annual meeting of the association will be held at Chicago on March 11-13, again at the Palmer House. Tied to the 1952 meeting (barring unforseen developments) will be another large exhibit of railway construction and maintenance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## Meetings and Conventions

**American Railway Bridge and Building Association**—Annual meeting September 17-19, 1951, Stevens Hotel, Chicago. Elise LaChance, Secretary, 431 S. Dearborn Street, Chicago 5.

**American Railway Engineering Association**—Annual Meeting, March 11-13, 1952, Chicago. Neal D. Howard, Secretary, 59 E. Van Buren Street, Chicago 5.

**American Wood-Preservers' Association**—Annual meeting, April 24-26, 1951, Stevens Hotel, Chicago. H. L. Dawson, Secretary-treasurer, 839 Seventeenth Street, N. W., Washington 6, D. C.

**Bridge and Building Supply Men's Association**—L. R. Gurley, Secretary, 201 North Wells street, Chicago 6.

**Maintenance of Way Club of Chicago**—Next meeting April 23, 1951. E. C. Patterson, Secretary-treasurer Room 1512, 400 W. Madison street, Chicago 6.

**Metropolitan Maintenance of Way Club**—Secretary, 30 Church street, New York.

**National Railway Appliance Association**—Robert A. Carr, Secretary, 310 South Michigan avenue, Chicago 4; Lewis Thomas, Assistant Secretary, 59 East Van Buren street, Chicago 5.

**Railway Tie Association**—Annual meeting September 25-27, 1951, Netherland Plaza Hotel, Cincinnati, Ohio. Roy M. Edmonds, Secretary-treasurer, 912 Shell Building, St. Louis 3, Mo.

**Roadmasters' and Maintenance of Way Association of America**—Annual Meeting September 17-19, 1951, Stevens Hotel, Chicago. Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

**Track Supply Association**—Lewis Thomas, Secretary, 59 E. Van Buren street, Chicago 5.

materials and equipment by the National Railway Appliances Association at Chicago's Coliseum. The officers of the N.R.A.A. have advised that plans for the exhibit are already taking shape.

At the same meeting the Board of Direction gave over a considerable part of its session to considering ways and means to permit and assure junior members greater participation in the activities of the association. All the suggestions will be further considered and developed by the Board Committee on Special Services, of which Vice President C. G. Grove is chairman.

Upon the recommendation of two technical committees, the association during 1951 will participate with other interested groups in two new studies, one dealing with prestressed concrete, and the other with the cleaning and painting of steel structures.

All chairmen of standing and special committees of the association have been asked by President Blair to meet with members of the Board of Direction at Chicago on Friday, April 20. The meeting will be held in the Illinois Room of the Palmer House, beginning at 9:30 a.m. With prior notice of this meeting some chairmen are planning to call meetings of their full committees, or of sub-committee chairmen on April 19, in the interest of conserving travel time. Following the meeting of chairmen, the Board of Direction will hold a special meeting.

## Maintenance of Way Club of Chicago

The March meeting of the club was held on the 26th at Eitel's restaurant in the Field Building, Chicago. The meeting was addressed by G. M. Magee, research engineer, engineering division Association of American Railroads, who spoke on "Maintenance of Rail Joints."

The next meeting will be held at the same place on April 23. This will be the annual meeting at which officers for the ensuing year will be elected. The speaker will be W. J. Whalen, assistant general manager, Chicago, Milwaukee, St Paul & Pacific.

## Bridge and Building Association

A meeting of the Executive committee was held at the Chicago Engineers' Club on March 12, the day preceding the opening of the annual convention of the American Railway Engineering Association. With President W. A. Huckstep presiding the committee transacted a considerable amount of routine business including the consideration of a number of membership applications, the selling of advertising in the 1950 Proceedings, and a discussion of preliminary plans for the program of the convention to be held in September of this year. The next meeting of the Executive committee will be held on July 23, also at the Chicago Engineers' Club.

*(Please turn to page 390)*


**Wise Old Owl says:**

"Neglect is the worst abuse a chain saw can get. In ordinary times, the worst name you could call that would be *waste;* now it's a downright crime. Saws are already in short supply; parts hard to get. Figures show that approximately 70 percent of repairs to chain saws are caused by *damaged*—not worn out—parts. Most of this damage can be prevented. What can I as a chain saw owner do? It's as simple as one, two, three:

**1. KEEP IT CLEAN.** Every day I clean the sawdust, leaves and muck from my machine.

**2. KEEP IT OILED.** Regularly, and according to the book.

**3. KEEP IT SERVICED.** I watch my saw the way a mother watches her child's behavior. A bolt tightened in time may save many days in the repair shop.

"Works, too. My four-year-old Disston still cuts as much wood as it did when it was new."

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**MAINTAIN YOUR CHAIN SAW.** Disston makes available—absolutely without cost—valuable preventive maintenance booklets and check-up charts. Follow these and you'll have a minimum of trouble. Send for your free copies today!

**SERVICE YOUR CHAIN SAW.** Disston Dealers are cooperating with the Fight Waste Program. They are located at strategic centers near you, and they are chain saw experts. You will save time and money by making a practice of bringing your chain saw in regularly for a check-up. These specialists can spot little troubles before they become big and expensive troubles . . . can help you get the most out of your chain saw.

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# Supply Trade News

## General

The **Binks Manufacturing Company**, Chicago has established a new sales and service office at 22-01 Forty-First avenue, Long Island City, N. Y.

**The Worthington Pump & Machinery Corp.**, Harrison, N. J., has announced a re-organization of its Construction Equipment Sales divisions. The Holyoke (Mass.) division and the Dunellen (N. J.) division have been consolidated, with headquarters at Dunellen. **W. J. Fleming**, formerly manager of the Holyoke division, has been named works sales manager of the consolidated division, and **J. S. Bachman** has been appointed field sales manager.

## Personal

The **Woodings-Verona Tool Works** and the **Woodings Forge & Tool Co.** have announced the appointment of **C. K. Luyster** as district sales manager, with offices in the Railway Exchange Building, St. Louis, Mo. Mr. Luyster was educated in the public schools of Brookfield, Mo., and the Missouri Wesleyan College. From 1926 to 1940 he was employed in the track and engineering departments of the Chicago, Burlington & Quincy, and was engaged in consulting work with Day & Zimmerman from 1940 to 1945. Since the latter date he has been a Woodings-Verona representative.

**Carl N. Rydin**, formerly with the Chicago, Burlington & Quincy engineering department as engineer and inspector, has resigned to become president of his own company, the **Rydin Railway Equipment Company**, with offices at the Railway Exchange, Chicago. His new company will handle a line of car couplers, including a special all purpose coupler for motor cars and trailers.

Carl N. Rydin

**T. E. Woodruff**, assistant manager of the Pump division of **Fairbanks, Morse & Co.**, has been promoted to manager of the division, with headquarters at Chicago. He succeeds **D. T. Johnstone**, who has been appointed Pump department manager of the company's San Francisco (Cal.) branch house. Mr. Woodruff has been associated with Fairbanks, Morse since 1912. After military service in World War I, he attended Iowa State College, graduating in 1926 with the degree of Bachelor of Science in Civil Engineering. For several years Mr. Woodruff served as manager of the pump department in the company's St. Louis (Mo.) branch, and has been assistant manager of the Pump division for the past year and a half.

T. E. Woodruff


**Protect Timber Bridges and Trestles From Grass and Weed Fires...Use**

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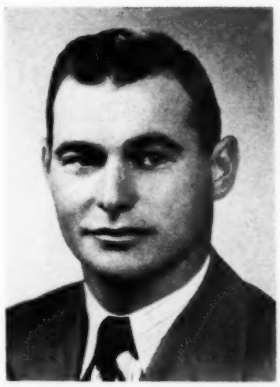
DIVISION OF BORAX CONSOLIDATED, LIMITED
510 WEST SIXTH STREET • LOS ANGELES 14, CALIFORNIA



Left to right—Frank J. Benko, Jr., John Benko, Robert Bogan, Fred T. Grant

The **Power Ballaster Products Division** of the **Pullman-Standard Car Manufacturing Company,** Chicago, has announced the appointment of four sales-service representatives. They are **Frank J. Benko, Jr.,** Southwestern representative, **John Benko,** West Central representative; **Robert Bogan,** Northwest field-service representative; and **Fred Grant,** Western representative. All will have headquarters at Chicago.

**Leslie M. Cassidy,** president of the **Johns-Manville Corporation,** New York, has been elected chairman of the board and chief executive officer, succeeding the late **Lewis H. Brown. Adrian R. Fisher,** vice-president, has been elected president to succeed Mr. Cassidy. **William R. Wilkinson** has been appointed vice-president for sales, and **Kenneth W. Huffine** has been appointed vice-president for production.

The **Dearborn Chemical Company,** Chicago, has announced the election of **Roger Q. Milnes,** vice-president of the company's Railroad department, to the board of directors. Before he became associated with Dearborn 24 years ago,

Roger Q. Milnes

Mr. Milnes had served as a locomotive fireman on the Colorado & Southern, a locomotive engineer on the Atchison, Topeka & Santa Fe, and fuel conserva-

*(Continued on page 392)*

## BALLAST IS SCREENED BY CONTRACT — ELIMINATING INVESTMENT BY RAILROADS IN THIS ONE-OPERATION EQUIPMENT . . .

**Stone ballast cleaned by the Speno method is thoroughly cleaned because it is screened twice. In order to obtain a thorough cleaning, two passes are necessary to restore the ballast to as clean a condition as when it was originally placed in the track. The two passes are accomplished in less time than a single pass by other mechanical methods.**

**Preferably, the ballast is cleaned ahead of a general track raise, and under the Speno method, no cribbing is necessary. Because of the drainage that the Speno method attains, the cleaning lasts from one general raise until it is time for another general raise, normally over a period of from three to six years, depending on conditions.**

**Speno equipment, working under traffic without interference with railroad operation, (the track adjacent to the one being worked is not fouled by our equipment in working position) easily keeps ahead of track raising programs.**

**The high production and low cost of this service are worthy of consideration.**

**FRANK SPENO RAILROAD BALLAST CLEANING CO. INC.**

306 North Cayuga Street — Ithaca, New York

tion engineer, test engineer and road foreman of engines on the Florida East Coast. He was elected assistant to vice-president of Dearborn's Railroad department in 1937 and assistant vice-president in 1939. In 1944 he became vice-president, Dearborn Chemical Company, and in the following year he was elected a director of the Electro-Chemical Engineering Corporation.

**John E. Carroll**, general sales manager of the **American Hoist & Derrick Co.**, St. Paul, Minn., has been elected vice-president of sales. Mr. Carroll was graduated from the University of Minnesota and in 1937 joined American Hoist as a district representative, working successively in the Texas, Chicago and west coast territories. He resigned his sales position in 1945 to become a partner in the Harron, Rickard & McCone Co. of southern California. Mr. Carroll rejoined American Hoist as general sales manager in 1949.

John E. Carroll

**John B. Dempsey**, manager of the Pittsburgh (Pa.) branch of the **Independent Pneumatic Tool Company**, has been named manager of the Detroit (Mich.) branch, succeeding **Robert G. Favorty**, who has been appointed managing director of Armstrong-Whitworth & Co., Pneumatic Tools, Ltd.,—a new Independent Pneumatic subsidiary in England. **Edward W. Krantz**, manager of the New York branch, has been appointed Pittsburgh manager to succeed Mr. Dempsey. **William J. McGraw**, manager of the Cleveland (Ohio) branch has been appointed manager of the New York branch to succeed Mr. Krantz, and **Clarence B. Bergren**, service engineer in the St. Louis (Mo.) territory, has in turn been named Cleveland branch manager to succeed Mr. McGraw.

The board of directors of the **American Hoist & Derrick Co.**, St. Paul, Minn., has elected **Robert J. Stoddard** to the position of vice-president of engineering. Mr. Stoddard is a graduate of the University of South Carolina and undertook advanced work leading to a Master of Science degree at the Massachussetts Institute of Technology. He started his business career with the American Bridge Company and later went with the Tennessee Valley Authority. He became associated with American Hoist in 1937 as assistant chief engineer and was appointed chief in 1947.

Robert J. Stoddard

**R. B. Little** has been appointed general sales manager of the **Eaton Manufacturing Company, Reliance Division**, Massillon, Ohio.

## Obituary

**John G. Little**, who retired in 1948 as assistant to vice-president of the Simmons-Boardman Publishing Corporation, with headquarters at Cleveland, Ohio, died recently.

**Robert E. Thayer**, vice-president and a director of the Simmons-Boardman Publishing Corporation, with headquarters at New York, died on February 25 in an automobile accident.

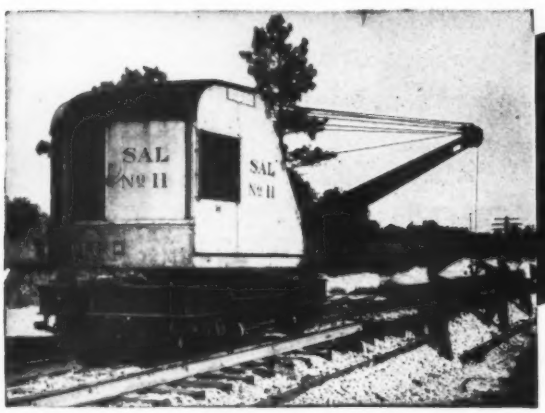
## Trade Publications

*(To obtain copies of any of the publications mentioned in these column, use postcards, page 343.)*

**Wood Preservative**—J. H. Baxter & Co., has published a 12-page booklet, printed in two colors, which traces the history of Chemonite—a copper-arsenate wood preservative—gives facts and figures to show its efficiency, and indicates its correct use.

**Storage of Coal**—The Allis-Chalmers Manufacturing Company, Tractor division, has issued an 8-page educational bulletin entitled "Economic Coal Storage". The publication is designed as a training aid on safe, orderly coal-handling methods.

**Retaining Walls**—The use of Armco bin-type retaining walls for embankment stabilization is discussed in a new 16-page illustrated bulletin published by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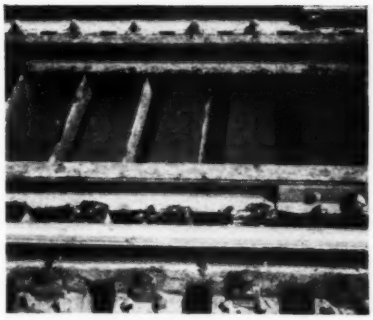

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Exclusive Sales Agents To Railroads

*TMDCC

Armco Drainage & Metal Products, Inc. The bulletin contains photographs illustrating methods of installation and numerous illustrated case histories.

**Caterpillar Products**—This is the title of a new 40-page booklet issued by the Caterpillar Tractor Company. The booklet, which is published annually, contains a complete list, with pictures and brief specifications, of all except two units of the current line of Caterpillar products—81 in all. Included are 9 of the 11 new models announced during the past year.

**Buda Jacks**—The Buda Company has published a 16-page booklet, designated as Catalog No. 1515, which describes and illustrates the complete Buda line of ratchet, screw and hydraulic jacks, ranging in capacity from 3 tons to 75 tons. Included in the catalog are tables to aid in selecting the correct jack, application pictures, recommended uses, special features of each jack and detailed specifications.

**Water Pressure Reducing Valve**—A new six-page bulletin containing complete technical information on Golden-Anderson's water pressure reducing valve is now being offered by the Golden-Anderson Valve Specialty Company. The bulletin features the general arrangement of the valve and the reducing pilot valve, and gives a complete list of parts Data concerning installation. operation, servicing and specifications of the valves are presented, as are tables showing dimensions and shipping weights.

**Weed Killer**—The Reade Manufacturing Company has published a 4-page bulletin dealing with its arsenical vegetation destroyer, Herbicidol. After listing the feature of the material, the bulletin mentions the fact that the product is now insured against cattle liability for the sum of $100,000.

**Nordberg Equipment**—All the various types of equipment manufactured by the company are described in a new 28-page 2-color bulletin, designated as No. 187, published by the Nordberg Manufacturing Company. Well illustrated, the bulletin contains data on Nordberg diesel engines, gasoline marine engines, Symons cone crushers and screens, mine hoists, machinery for processing ores and minerals, air and gas compressors, and railway track-maintenance equipment.

**Protective Coating**—The Plastic Coating Corporation has issued a bulletin on the use of a vinylite liquid plastic for protecting metal, wood or concrete surfaces. Following a discussion of the physical and chemical properties of the material, the bulletin tells how the coating is applied and describes typical installations. One section of the bulletin is devoted to the application of the liquid plastic for the protection of pipe. The concluding section gives data on the use of the plastic with suitable flint abrasives to form non-skid coatings on wood, metal, concrete or canvas surfaces.

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IT'S STRONGER—
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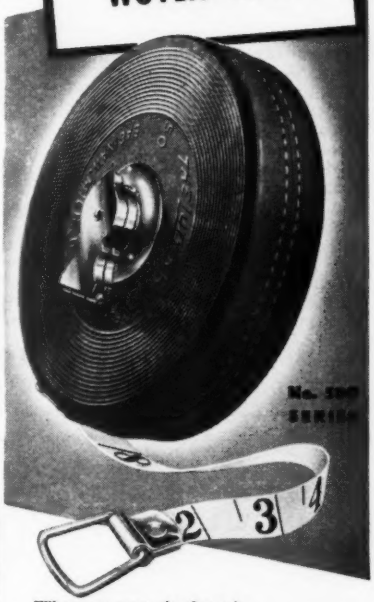
LONGER LASTING
...the improved
LUFKIN
"metallic"
WOVEN TAPE

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1 New, stronger linen line with metallic strands . . . resists stretch and shrink . . . is non-fraying.
2 New, smooth coated finish protects line against wear and moisture.
3 Case of select, genuine leather, closely hand-stitched over rust-resistant metal liner. Ample size folding winding handle.
4 "Instantaneous" readings . . . foot markings in red, remainder in black . . . saves measuring time.
5 Patented *Lufkin* Threader for easy line replacement.

Lines are ⅜-inch wide—marked one side only, feet, inches and half-inches; or feet, 10ths and half 10ths feet: in 25, 50, 75, 100 and 150-foot lengths, with or without hook ring. Your supply house stocks them . . . ask for the improved *Lufkin* "Metallic" Woven Tape.
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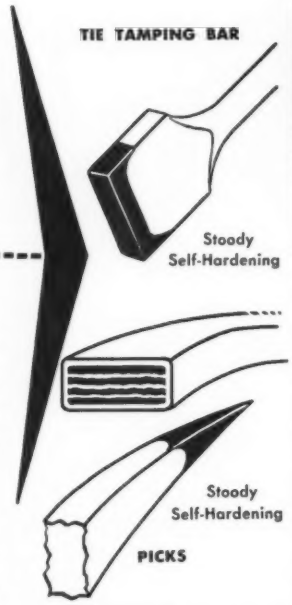
Here's an everyday example—dull pick points and worn, rounded tamping bars are symptoms of abrasive wear. It exists on *all* your equipment, large or small, from hand tools to heavy machines. But abrasive wear can be reduced by hard-facing with Stoody Alloys. Welded to new parts or old, life is usually 200% greater than factory originals—frequently more! To cut maintenance and down time and to reduce new part replacements, start hard-facing today with Stoody Alloys! Application information and alloy recommendations for *your equipment* are in the STOODY HARD-FACING GUIDE-BOOK. Write for complimentary copy!

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**SET FIRMLY—STAND STRAIGHT FOR THE "BIG LIFT" IN**

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**SIMPLEX A5** Capacity 15 tons; weighs only 28 lbs. 5" lift.

**SIMPLEX 15A** All parts interchangeable with A5 except malleable housing. Weighs 41 lbs.

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**ELECTRIC ROTATION** together with electric travel reduces maintenance to a minimum.

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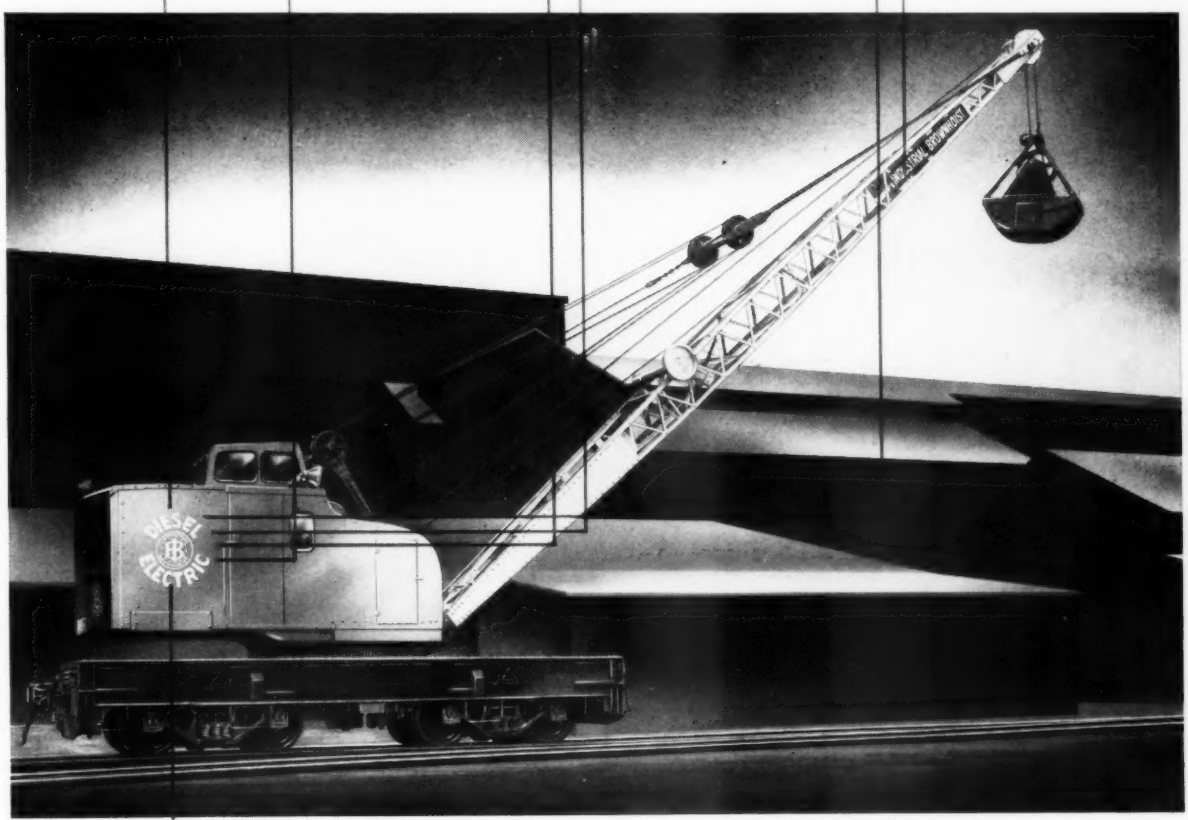


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